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To consider and take action upon all general questions relating to the navigation and carrying business of the Great Lakes, maintain necessary shipping offices and in general to protect the common interests of Lake Carriers, and to improve the character of the service rendered to the public.

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SOUND SIGNALS IN FOG.

Almost every serious accident in the fog, be it a collision or a shipwreck, results in many wise remarks and conclusions as to the attentiveness of the crew on the one hand, and on the other to elaborate suggestions for signal systems. Both are applicable and efficient under strictly normal conditions, and both fail in the exceptional case.

Any one who has been out on the water in a fog knows how difficult it is to fix the direction from which the sound is coming. If this could be done reliably and regularly most of the accidents would be avoided.

More than thirty years ago this problem engaged the attention of the Light-House Board, and elaborate experiments were carried out under the direction of Joseph Henry, the first secretary of the Smithsonian Institution. Such men as W. B. Taylor, G. G. Stokes and John Tyndall have also devoted much time and thought to the explanation of the perplexing observations. A few examples of the peculiar behavior of sound at sea may be of interest.

"The steamer City of Richmond, approaching the light station at Whitehead, Me., in a dense fog, first heard the station signal at a distance of six miles, and thereafter with increasing intensity until it suddenly disappeared at a distance of three miles, and was not heard again until within a quarter of a mile of the station."

The light-house keeper heard the steamer's whistle all the time. In another case "there was heard after each sound of the whistle a distinct echo from the broad unobstructed ocean, which was attributed (rightly) to reflection from the crests and hollows of the waves." This echo is very often reported. At another time, with the wind less than half a mile an hour, the sound of a whistle was heard one and one-half miles against the wind, and five miles with it, while an hour and a half later, with the wind ten and one-half miles an hour, whistles were heard four and one-half miles against the wind and five miles with it. At Block Island an observer on the beach heard the whistle of a departing vessel, the sound traveling against the wind, for only one minute, while another in a tower 200 feet high heard the whistle four and one-half minutes. On another occasion, the sound traveling with the wind, the observer in the tower heard the sound for fifteen minutes, while the one at the base heard it for thirty-four minutes.

This observation is much more pronounced than usual; still, a series of observations showed that in hearing against the wind the observer in the tower heard at three times the distance as the one at the base, but on hearing with the wind the one at the base had the advantage by about 25 per cent.

A case was reported a few years ago from a summer resort on the Maine coast of a warship sailing past with her band playing. The music was perfectly audible for a time, then suddenly ceased without apparent cause, only to re-

appear a little later. In fact, the reports of the Light-House Board are full of cases where sea captains have reported fog signals as out of order and intermittent where there is no doubt that the signal was in proper operation all the time, but that the air was playing pranks with the sound.

When it is realized that we have perplexing echoes from waves, and even from fog banks or masses of fog of different consistency, and that a moderate wind will make a difference of three times in the distance at which a sound can be heard with and against it, and when we consider how seldom our atmosphere can be called still or homogeneous, it may well be understood that almost anything is better as a signal than a whistle. Indeed, the Mundy system of signaling with submerged bells would have many advantages over confiding our safety signals to the shift and uncertain air. Here is a case where the operation of wireless telegraphy is certain to be efficient and satisfactory. William Hallock, Professor of Physics, Columbia University.

COST OF OCEAN CABLES.

Mr. Marconi believes that his system may become a formidable competitor against the ocean cables. To do so on land is not easy, as the lines there cost only \$100 a mile, whereas the cables cost \$1,000 a mile, and require expensive steamers to repair and maintain them. A trans-Atlantic cable represents an initial outlay of at least \$3,000,000, besides the cost of its maintenance. A Marconi station can be built for \$600,000. Three of these, bringing the two worlds into contact, will cost only \$180,000, while their maintenance should be insignificant. What his success will mean can be best grasped by considering the extent of the property which would be displaced thereby, although it is only since August 5, 1858, forty-three years ago, that the first Atlantic cable was laid. There are now fourteen laid along the Atlantic bed, and in the whole world 1769 telegraph cables of various sizes, with a total length of almost 189,000 nautical miles, enough to girdle the earth seven times. These require a great number of ocean-going cable steamers for their laying and repairs, and while the total value of the cables cannot be easily computed, it is known to be a fact that British capitalists have \$100,000,000 invested in cable stocks.—The Century.

COASTWISE COMMERCE ON THE LAKES.

The traffic on the Great Lakes during March consisted principally in cross-lake traffic on Lake Michigan. The month of March also marks the opening of local traffic along the other lake shores and between the Detroit river and Lake Erie ports. Several cargoes of ore from Escanaba, and a few cargoes of wheat from Duluth cleared for lower lake ports during the last week of the month.

The rates of freight prevailing during the month, together with the contracts made for the season, were as follows:

On grain, from Chicago to lower lake ports: Wheat, 1 3/4 cents per bushel; corn, 1 1/2 cents and 1 5/8 cents per bushel; oats, 1 1/4 cents per bushel.

On coal, from lower lake ports to head of lakes, 30 and 35 cents per ton; to Milwaukee, 45 cents per ton. Very little season chartering was done.

On lumber, from Lake Superior ports to Lake Erie ports, \$2.50 per thousand feet; Green Bay to Lake Erie ports, \$2 per thousand feet.

On iron ore, the following season's rates were made: From head of lakes to lower ports, 75 cents per ton; from Escanaba, 55 cents per ton, and from Marquette, 65 cents per ton. In each case these rates are 5 cents below the contract rates made last month.

On the Great Lakes through traffic between the upper and the lower lakes began with several clearances of cargoes of ore and wheat for lower lake ports. The March tonnage of translake and shore trade reported reached 251,293 net tons of freight, compared with 185,513 tons in March of 1901. The coal traffic for the year 1901, by ports, and the quantity credited to each port for fueling of steam vessels is given in detail. The total shipped as vessels' fuel at 121 ports, as reported by 129 firms in the coal trade, was 1,759,272 tons, a figure which may be taken as easily within the requirements of steamship consumption on the lakes for the year of 1901. Bureau of Statistics.

UNIFORM SYSTEMS OF BUOYAGE AS ADOPTED BY VARIOUS MARITIME NATIONS.

BY LIEUT. T. A. KEARNEY, U. S. N.

In a supplement to the Monthly Hydrographic Office chart, May, will be found a graphic and concise description of the systems of buoyage as adopted by the various maritime nations mentioned, the same having been compiled from the Sailing Directions and Hydrographic publications on file in this office.

The general systems in use may be subdivided into two classes.

I. That in which the buoy or mark is to be left on the starboard or port hand irrespective of any compass course.

II. That in which the buoy or mark is to be left to northward, southward, eastward, or westward, as determined by the general compass direction of the channel, and irrespective of starboard or port hand.

In those systems where the terms starboard and port are used, the starboard hand denotes that side which would be on the right hand of the mariner either going with the main stream of flood, or entering a harbor, river, or estuary from seaward. The term port hand denotes the left hand of the mariner under the same circumstances.

It will be noted that buoys approximate to similar shapes and names, thus all buoys showing the pointed top of a cone above water are called conical or nun. Buoys showing a flat top above water are called can, and those showing a domed top are called spherical. A buoy showing only a mast above water is called spar. Under the classification of "special buoys" are included bell, gas, and automatic sounding buoys of all descriptions, as used to mark special positions either on the coast or in the approaches to harbors.

It is not the purpose of this article to go into the detailed description of the systems, but merely to give the general plan, calling attention to colors, shapes, or top-marks when they are of a uniform nature as distinguishing features.

Information regarding other systems not mentioned in this article, or comments thereon, should be sent to the Hydrographic Office, Washington, D. C.

HYDRAULIC PROPULSION.

John Forrester, of Prince Albert, Ont., who is a man of some leisure and means, with the practical common sense of a Scotchman, has been interesting himself in an invention for the propelling of vessels on the high seas. Mr. Forrester claims that he has reached a scheme by means of which the weightiest craft can be cheaply and rapidly propelled under almost any circumstances of calm or storm. In fact, the more tempestuous the sea, the more rapid the vessels progress. The scheme is ingenious, yet simple enough. A system of funnels is to be so regulated as to permit of access with the sea. These are so adjusted that the undulating momentum of the surrounding waters, producing great force as it does, can be utilized as a propelling power for the vessel. Through further mechanical contrivances the power so generated, the inventor claims, can be conserved, so that when needed it would be readily available.

BRIDGE COLLISION—VESSEL'S CLAIM UPHELD.

After a contest lasting two years, the city of Chicago was yesterday defeated in a case that was stubbornly fought at every stage. In the spring of 1900 the schooner Commerce, in tow of a Great Lakes Towing Co. tug, ran into Wells street bridge and suffered considerable damage, as well as damaging the bridge. In the first decision by Judge Kohlsaat, the damages were assessed equally on the towing company and the city. The latter was dissatisfied with the verdict, and carried the case to the United States court of appeals, where all of the damages were thrown on the municipality. Judges Jenkins and Grosscup decided that "gross negligence or gross incompetence" on the part of the city employees caused the accident. The decision is of great importance, as it bears directly on a number of other cases pending, and also settles the "red ball" question. It was shown that the bridge tender had lowered the red ball as a signal to go ahead, and that afterward the bridge was turned too far around and caught the schooner's rigging before she cleared the draw



DETROIT.

The steamer Balize has been changed from American to Canadian registry to conform to the laws regarding raft towing in Georgian Bay, in which trade she will now be put.

United States Engineer Bixby says nothing will be done towards opening a middle channel through the St. Clair flats until the River and Harbor Bill passes, as no money is available for that purpose. This delays double tracking the channel at least two years.

The ninth annual meeting of the Michigan naval reserves was held in the Light Infantry armory on Congress street. It was decided to abolish the dues of \$5 a year and reduce the initiation fees from \$10 to \$5. It was also decided to court-martial members who fail to attend drills.

The Detroit Trust Co. is placing on the market an issue of \$130,000 first mortgage 5 per cent. gold bonds, issued by the Hawgood Transit Co. on the new steel steamship Etruria. The vessel was completed April 15, 1902. She is 434 feet long, 50 feet beam, 28 feet deep and cost \$250,000.

Two steel steamers, built at the yards of the Craig Ship Building Co., Toledo, have been granted official numbers by the Bureau of Navigation, Treasury Department, this week. Both vessels hail from Toledo and are named the Charles Beatty, 986 gross and 814 net tons, and the Redondo, 679 gross and 462 net tons.

The following meteorological observations are furnished by the office of the U. S. Weather Bureau, Detroit, for the week ending May 13, 1902. Prevailing wind direction for the week, N.E.; highest velocity 36 miles, from the west on the 8th; mean temperature for the week, 50; highest temperature, 74 on the 8th; lowest, 34 on the 10th.

The barge Wand, which was sunk in collision some time ago at the mouth of Black river, at Port Huron, is rapidly filling with sand, and is listed to one side. The boat has also changed its position so that it is a menace to navigation. The owners have sixty days from the time the boat was sunk to raise her, and at the end of that time if nothing has been done the government will blow her up.

Capt. William Styon died at Port Huron on Friday, aged 85 years, and his body was taken to Marine City for interment. Capt. Styon was part owner of the barges T. Spademan and Marine City. He is survived by a widow who has been his companion for 65 years. Their life is said to have been most happy. They have two daughters living, Mrs. G. L. Boynton, and Mrs. Caswell, of Marine City.

Mrs. W. D. Regan, of Port Huron, widow of the late W. D. Regan, owner of the schooner Jupiter, which foundered in Lake Huron last fall, has begun suit against a fraternal insurance society on a \$2,000 life insurance policy held by the deceased. Capt. Regan and two sailors were lost on the Jupiter and nothing has ever been heard of the boat or the bodies. The insurance company claims that there is no proof of death.

During the thick fog on Lake Huron Sunday night the steamers George Spencer and Mohegan came together off Presque Isle. Both boats were proceeding slowly at the time on account of the thick weather or the accident would probably have been disastrous. The Spencer was bound for Milwaukee with coal and the Mohegan, having the Mingo in tow, was on her way down from Lake Superior. The Mohegan was not badly damaged by the collision and took the Spencer in tow for Alpena. The Spencer has a bad dent in her hull, her boiler is shifted and the steam pipe broken.

The White Star line has issued an attractive little booklet, calling attention to the opening of the outing season, the line of steamers employed in its service and the number of pleasure resorts reached by this line. There are several pretty illustrations of scenes along the river and lake, Tashmoo park, St. Clair flats, Belle Isle park, and the launching of the new steamer Greyhound, Feb. 15, 1902. A summer girl in red wading in the surf, with a Star Liner in the distance, adorns the cover of the booklet. A copy may be obtained by applying to C. F. Bielman, secretary and traffic manager.

The old side-wheel passenger steamer Darius Cole, which was the cause of much litigation between the Star-Cole Co., of this city, and the Williams Line, of South Haven, will be brought back here from South Haven June 1. The case was finally settled out of court, and the steamer taken back by her former owners. It is not known what will be done with the Cole, but she will probably be sold if a purchaser can be found. She is an iron-built boat of 538 gross tons, built at Cleveland in 1887

and for insurance purposes rates A1, with a valuation of \$70,000.

The Detroit river ferry boat Columbia was successfully launched on Saturday from the Wyandotte yards of the Detroit Ship Building Co., in the presence of a large number of spectators. The Promise left the foot of Woodward avenue at 1:30 and as the guests went on board they were decorated with carnations and badges by Miss Millie Clinton, daughter of the superintendent of the line, and Miss Crystal Campbell, daughter of the general manager. Zickel's orchestra played and Tom Swan served refreshments. The boat was christened by Miss Esther Campbell, the little daughter of the general manager, who broke a gilded bottle decorated with red, white and blue ribbons, over her bow as she left the ways. The contents of the bottle were known only to Passenger Agent F. J. Mason, and he refuses to tell what the mysterious fluid was. It was said to be nothing more than the waters of the noble stream the new boat will ply. The Columbia is 216 feet long by 45 feet beam of hull and 60 feet beam over the guards, with a draft of 12½ feet. Her extreme capacity will be 4,500 people, but it is expected the government limit will be 3,200. This will give her a greater capacity than the Pleasure, Promise and Sappho combined.

The Michigan fish commission has just moved its headquarters to a suite of offices in the Peninsular Bank building, which are being handsomely fitted up and in which the commission expects to have quite an exhibit of the fishes and fishing interests of the state. "We are just beginning on this spring's distribution of wall-eyed pike," said Supt. Bower, who has just returned from a trip to the different state hatcheries to-day. "We expect to distribute about 15,000,000 wall-eyed pike from the Mill Creek station this spring, and about 30,000,000 from Campau avenue hatchery in Detroit. The eggs were taken from fish caught this spring in Lake Erie. The fish will be distributed in the inland lakes in the western part of Michigan. We have finished the distribution of the rainbow and lake trout from the Paris hatchery. There were about 500,000 of the rainbow trout and they were planted in the larger streams of the state. The lake trout numbered about 1,000,000 and they were planted in the large, deep-water inland lakes. The distribution of the brook trout was finished about a week ago, and this spring we planted about 8,500,000 counting the total output from Paris and "Soo" hatcheries. They were distributed in different streams all over the state.

CHICAGO.

The grain trimmers' union at this port has been admitted to membership in the National Longshoremen's union, and the price for trimming grain was raised from 65 cents per 1,000 bushels to 75 cents, the rate which prevails in Chicago harbor. Considerable hard feeling has been caused by gangs of trimmers from Chicago invading the local field, but this will be avoided hereafter by the rules of the national association.

There is practically no change in the tugmen's strike, although meetings are being held and a great deal of talk is indulged in. It has been decided to tow all lumber boats in from the lake to their docks, regardless of their former agreements with the tug trust, but if they have contracts they cannot be given the service of a tug in getting out of the river again. The ban still remains on all vessels of the United States Steel Corporation and boats of the railroad lines.

The Marinette lumber market must be pretty well cleaned up as there were some big sales made last week. Isaac Baker, representing the Hines Lumber Co. and J. Phillips, of the Tucker Lumber Co., were up there and there was only about two million feet of last year's cut of pine and hemlock to ship. The Perley Lowe Co. sold considerable hard wood to the J. W. Jones Lumber Co. Devere & Schlogel, Milwaukee, bought two million feet of pine and hemlock at different yards, and there was also a buyer from Germany looking over the situation with a view to purchasing stock for foreign use.

For the first time in the history of the company the Goodrich Line has arranged to pro rate with connecting lake lines so as to give its passengers the benefit of a choice of routes all over the Great Lakes. The new schedules show forty-nine routes other than those covered by the regular steamers of the line. The summer schedule for 1902 is much more elaborate than in former seasons. It includes half-tones with descriptions of many of the most important and attractive scenes on both the Wisconsin and Michigan shores of the lake and of island scenes in Green Bay.

Showers of brick and opprobrious comments hurled from bridges along the Chicago river by supporters of the strike of tugmen against the Great Lakes Towing Co., have driven the independent tugmen of the Chicago fleet to placard all their vessels with signs reading "Union Crew." Since the beginning of the strike the men on the independent towing vessels have been objects of attack from persons mistaking them for non-union workmen. The attacks were disregarded until heavy stones, bricks and pieces of iron fell so promiscuously and so near the men, that they were afraid to pass bridges, particularly in the manufacturing districts along the north branch.

Charles E. Kremer, Esq., the admiralty lawyer, left for Duluth on Wednesday night, where he will try to prevent the United States government from getting \$4,000 from the steamer Shanandoah. The steamer ran into the new breakwater at Two Harbors, Minn. It is claimed on the part of the steamer that there was an extension of 500 feet put on the old breakwater, with only a small white light at the end of the extension. The Shenandoah came alone and endeavored to pass between the new white light and the red light at the end of the old breakwater. The result was that the new structure was the worse for the encounter. The government is suing in the United States court at Duluth.

BUFFALO.

The last quoted freight rates on coal are merely nominal and without change: To Milwaukee, 40 cents; Duluth, 30 cents; Ashland, 30 cents; Chicago, 40 cents to 50 cents; Manitowoc, 40 cents; Washburn, 30 cents; Fort Colborne, 25 cents.

The following meteorological observations are furnished by the office of the U. S. Weather Bureau for the week ending May 14. Prevailing wind direction for the week, N.E.; highest velocity, 50 miles, from the S.W. on the 9th; mean temperature for the week, 47; highest temperature, 62 on the 8th; lowest, 32 on the 10th.

The Pennsylvania State fish hatchery has been very busy this spring, and has turned out a great number of fish for the lakes. Fifty-two million white fish, six million pike, twelve million herring, have already been placed in the water. The hatchery expects to place twenty million blue pike and forty million perch in the lake off Erie before the summer season begins.

As far as Buffalo is concerned, the situation is the same as it was when the strike was ordered. The Great Lakes tugs are still tied up in the Dakota slip, and it looks as if they had really gone into winter quarters. The only tugs doing any work here are those of the independent line. Even the little canal tugs, which at times put lines on the big boats to help them wind, are now strictly attending to the work of moving canal boats only.

The local customs office has received notice from Secretary of the Treasury Shaw, referring to the complaints received from travelers against the customs officers concerning the incivility and rude methods of those officials in their inspection of baggage. Secretary Shaw instructs the inspectors to be careful in the handling of the effects of the traveling public. This notice applies to the lakes as well as the coast cities, and concerns a matter which has caused a great deal of unfavorable discussion relative to the searches. It is probable that Cleveland, Detroit, and other ports have received similar notices.

William A. Rogers and F. H. and C. W. Goodyear have formed a company with a capital stock of \$3,000,000 to build two large modern blast furnaces at Buffalo for the manufacture of foundry pig iron. An option has been secured on fifty acres of land near the Lackawanna steel plant as a site. Work is to begin this summer, and the plant will be completed in two years. The company will have its own ore properties in the Lake Superior district, and mines of coking coal in Pennsylvania. The output of the furnaces will be 400 tons of pig iron daily. The Buffalo & Susquehanna road, owned by the Goodyears, will be extended to Buffalo.

We have not heard the last of the Knapp roller boat, in fact Frederick A. Knapp, Esq., barrister, naval architect, marine expert, etc., etc., is only now beginning to advertise the prospectus of his \$3,000,000 company, of 30,000 shares; par value, \$100. The Knapp Tubular Steamship Co. has an authorized capital of \$3,000,000, and the following gentlemen constitute the board of directors: Hon. George E. Foster, formerly finance minister of Canada, Toronto; Frederick A. Knapp, barrister, Prescott, Ont.; Frank Buller, doctor of medicine, Montreal; Matthew Hutchinson, K.C.M.L.A., Montreal; Francis R. F. Brown, consulting engineer, Montreal.

The burning of the large Wells elevator appears to have hastened the formation of plans for the one proposed at Black Rock, near the International bridge. For a number of years grain men have deplored the absence of an elevator in this part of the city. All through shipments of grain to the east had to be weighed by platform scales or not at all. Now the announcement is made that work will be begun on a new steel elevator at Black Rock in the near future and that by fall suitable hopper scales and the first storage tank to contain about 50,000 bushels will have been erected. In speaking of this matter one of the grain men directly interested, said that the construction work will actually be begun as soon as the Michigan Central, Wabash and Grand Trunk, which are the three lines crossing the bridge, agree to absorb the elevator charges, that two of the roads have already agreed to this and the third was considering the matter favorably. Spencer Clinton, attorney for the Wells estate which owned the burned elevator, states that it is likely that a new steel elevator will be built in place of the one destroyed as soon as the price of construction metal goes down.

The Booth Fish Packing Co. have sold the barge Wyandotte to C. C. Baumhart, of Vermillion, who will at once convert her into a lumber carrier. The work will be done at Vermillion. The price is not named.

DULUTH-SUPERIOR.

Duluth vessel agents report a stronger feeling in grain freights. Steamers are asking 13½ cents, and a few cargoes have been placed at that figure. The rate has been as low as 1½ and 1¾ cents.

A steel tank elevator at Fort William, with a capacity of 1,500,000 bushels, caught fire on Saturday and all the machinery and tower were destroyed; also eight cars of wheat standing near. The damage is estimated at \$80,000 to \$100,000. Combustion in one of the tanks is believed to have been the cause of the fire.

William Brown, mining expert and explorer for the Eastern Minnesota, is in the city. Mr. Brown says that work is active in all sections of the Minnesota ranges, but that very little new iron territory is being added to that already well proven. He is of the opinion that the outlines of the ranges are already well defined, and expresses the belief that discoveries of the future will be made practically within those limits.

Capt. D. D. Gaillard, United States engineer in charge of river and harbor improvements on Lake Superior, has undertaken to furnish commercial statistics monthly instead of a single and complete report each year. He says that he would like very much to issue his monthly report on or about the 10th of each month for the business of the preceding month, but in order to accomplish this it will be necessary for him to get reports from the boats promptly. Capt. Gaillard says that he would greatly appreciate the co-operation of owners, agents and masters in the matter of getting as quick returns as possible in this respect.

About 3,000 men are now earning their livelihood on boats hailing from the head of the lakes. An estimate of the craft enrolled in this district shows an aggregate of 300, with a larger tonnage than any other district on the lakes. It has recently occurred to the Commissioner of Navigation, at Washington, that his office ought to know how many men are earning their living afloat, so he has commenced the count, and the information will, no doubt, be contained in the next issue of the government "Blue Book," a copy of which is furnished to owners, masters and others upon application at the Custom House.

The large addition to the Eastern Minnesota ore dock at Allouez is expected to be finished and shipping ore by June 1. Work on it is being rushed, and a large number of the pockets are already completed. With this added capacity to the dock it is expected that Superior will see the biggest ore season in its history. Sanguine estimators figure that 4,000,000 tons will be handled during the season. This would make Superior one of the very largest ore shipping points on the Great Lakes. The season's shipments have been heavy. In April 190,000 tons were sent out, while for the first six days of this month, 86,815 tons were handled. Last year's shipments amounted to 2,321,000 tons.

The new steamer Iroquois, purchased by the White Line Transportation Co. for passenger and freight business between the head of the lakes and the copper country, and also for excursion work is a boon to business and pleasure interests alike. She will be used Sundays in excursions to the Apostle Islands. She has a speed of twenty-one miles an hour which is the best on Lake Superior. The Iroquois is built of steel and was constructed at the yards of the Craig Ship Building Co., Toledo, O., in 1901. Her length over all is 220 feet and her beam is 34 feet. She has four water-tight compartments, steel boiler house, electric light plant and four boilers; is allowed 200 pounds of steam, and has triple expansion engines.

Head of the lakes to Quebec, and from Quebec to Europe—two cargoes of grain have left by that route so far this season, and others will follow. This will make but one handling of the grain necessary before it reaches Liverpool or the other European ports to which it is bound. It is believed that this shipping of grain from here to tide-water may have important results. At any rate it is one step nearer a deep water route to Europe. Under the present conditions, only the smaller of the lake boats can take the trip, because of the Welland Canal and the St. Lawrence rapids. In any case the greater portion of the European wheat will go by way of Buffalo. The two steamers that have cleared this spring are the J. Duncan and the Britannic. The former carried 41,224 bushels of wheat and the latter 41,000. While these carried the first two loads others will follow. These boats belong to the newly chartered line, composed of about a dozen steamers, all of about the same size, which will be used exclusively for the purpose of carrying grain between Superior and Quebec. Before the end of the season it is expected that a large amount of grain from the local elevators will be shipped via the Quebec route.

The Lehigh Valley Coal Co. has begun work upon contemplated additions to its West Superior plant and will expend not less than \$30,000 between now and June 1 for that purpose. The work now under way is the construction of an enormous soft coal dock, at the yards of the company at the foot of Banks avenue adjoining Tower slip. The dock will have a capacity of 75,000 tons, occupying a ground space of 300 feet square immediately north of the big iron wigwags used for housing anthracite coal. The contract for the work has been let and work is being pushed as rapidly as possible. The dock will require the sinking of more than 100 piles, and will contain

ten runways which will connect with the hoists adjoining the slip. When this improvement is completed the Lehigh people will be in such position that they can load the coal directly from vessels into the cars, if they desire. Supt. Thomas W. Barnes, of the Lehigh company, states that they will this year handle fully 100,000 tons more than last year, and he gives it as his opinion that with the additions now being constructed by the Lehigh Coal & Coke Co. and the new Northwestern dock added to the receiving list, the receipts of coal at the port of Superior during the current year will exceed those of last year from 300,000 to 500,000 tons.

CLEVELAND.

The signal letters granted to the steamer Minnewaska, 5,273 tons gross, of Cleveland, are K R P I L.

The Pittsburg Steamship Co. has issued instructions to masters to load to a depth of seventeen feet six inches, which is an increase of three inches.

All the local tugs of the Great Lakes Towing Co., are still tied up, and no move has been made to start any of the boats. President Newman, of the towing company, said that there was no change in the situation.

Capt. George B. Brock, master of the steamer Pioneer, had to leave his boat when she came in from Buffalo last Saturday, on account of sickness. Capt. William C. Goodsell took the Pioneer out and she sailed for Marquette.

The steamer L. C. Smith, building for the United States Transportation Co., was launched at the Bay City yard of the American Ship Building Co., on Wednesday afternoon. Capt. W. W. Brown, general manager of the Transportation company, witnessed the launch.

Mr. R. B. Wallace, for the past two years superintendent of the West Bay City ship yards, has been transferred to Cleveland, to become superintendent of hull construction for the American Ship Building Co. He will be succeeded by O. H. Warren, of Cleveland.

The steel steamer building at the Lorain yards of the American Ship Building Co., will, on Saturday, be launched at noon. The boat is building for W. A. Hawgood & Co., of Cleveland. She will be named the James M. Jenks. She is the second of an order of three boats placed by this firm.

The steamer Choctaw, now in dry-dock at Lorain, grounded at Marquette a few days ago and was badly damaged. About 40 plates will be taken off and replaced. The frames are also in bad shape and much work will be required to make final repairs. It is one of the biggest dry-dock jobs handled in a long time.

The Detroit & Cleveland Navigation Co. has arranged to take the geology classes of all of the high schools of Cleveland to the islands May 31 for a day's outing and an inspection of the rock formations. Heretofore the West High School alone has taken the trip, but this year Professor Dutton has invited all of the schools and the invitation has been accepted.

The resignation of Capt. A. J. Greenley as master of the steamer Rensselaer, of the Pittsburg Steamship Co.'s fleet, made a number of changes. Capt. H. J. Regan, who was mate of the steamer Van Hise, was promoted to master of the steamer John B. Trevor. Capt. John Dunn, who was on the Trevor, takes the steamer Maritana, and Capt. W. E. Chilson, succeeds Capt. Greenley as master of the Rensselaer.

The following meteorological observations are furnished by the office of the U. S. Weather Bureau, for the week ending May 14th. Prevailing wind direction for the week, N.E.; highest velocity 48 miles from the N. on the 8th. Mean temperature for the week 50; highest temperature 72 on the 8th, lowest 32 on the 10th. Sunrise and sunset data computed for local time: May 16th, sun rises 4:38, sets 7:14; May 19th, sun rises, 4:35, sets, 7:17; May 22d, sun rises, 4:32, sets, 7:20.

Patrick Smith, the pioneer tug owner, died last Sunday, at his home, corner of Washington and Pearl streets. Death came as the result of an accident on the Superior street viaduct, where he was struck by a street car Wednesday evening. Until midnight Saturday he seemed to be recovering from the injuries received, but at that time there was a change for the worse and he died a few hours afterwards. Mr. Smith was for years one of the most prominent men in Cleveland. He was born in Bailyboro, county Cavan, Ireland, March 17, 1827, and came to Cleveland with his father, when he was a small lad.

W. F. Herman, general passenger agent of the Cleveland & Buffalo Transit Co., has just issued a book of summer tours, which has had a general distribution among the agents of connecting lines. The book treats especially of Cleveland and Buffalo and gives quite a description of the two cities. The articles are illustrated with attractive photographs. Eastern scenery is also pictured to show the connections which the C. & B. steamers make. This line is a progressive and favorite one. A marked feature is a consideration for the traveling public and that all conveniences should be granted to passengers.

George H. Higgs, city passenger agent of the Detroit and Cleveland line, has just contracted for the first excursion between Cleveland and Put-in-Bay. About all

of the pleasure traveling of this nature out of Cleveland by the water routes will be confined to these Put-in-Bay trips this summer. The Euclid Beach boats have been taken off the run, and the employment of the steamer City of the Straits in other lines of trade will remove the possibility of Sandusky excursions. In addition the D. & C. line has decided not to reintroduce the moonlight rides, having no boats with which to handle them. This has induced the passenger officials to make a feature of the Put-in-Bay service, which will be regular after May 25.

Seven young people, members of the Sunday school class of the First Baptist church, were drowned in the Maumee river, at Toledo, last Thursday night. The naphtha launch Frolic, on which they were taking a pleasure ride, was run down by the tug Arthur Woods, of the Great Lakes Towing company's fleet. The launch is owned by Joseph W. Hepburn, who invited eleven young people to take an evening ride with him. They started on the trip to Lake Erie early in the evening, and were returning when the accident happened. The lost are: Irwin Swain, Bessie Leese, Edna Lowe, William Fanner, Bessie Byscrum, Eulalie Richard and Grace Haspin. Mr. Hepburn, Miss Clara Marks, Arthur Marks and Miss Grace Lowe were the survivors. Full and complete inquiry is being made into the causes leading up to the casualty.

Those who have looked into the working of the new Nicholson "perfected ship log" pronounce it one of the most valuable of recent inventions, while those who have it in use on their boats are enthusiastic in its praise. A number of new lake steamers are now being equipped with the log, among which is the Tashmoo, which last year raced the City of Erie and lost. The latter boat was equipped with a Nicholson log, and by its record the speed of the boat throughout the entire course could be learned at a glance. The value of the Nicholson log for ocean steamers must soon become apparent. Like wireless telegraphy it is a modern invention which we must have. The company has some fine literature on the subject which they will be glad to send to those interested. Their address is: Nicholson Ship Log Co., 204 Superior street.

Capt. John T. Hutchinson, one of the oldest vessel owners and brokers on the lakes, died suddenly in his office on Wednesday afternoon, aged 68 years. He built the schooner Emma C. Hutchinson, in 1873, at that time one of the best vessels on the lakes. Mr. Hutchinson's first steel vessel was the 5,000-ton steamer that bears his name. As business prospered with him he increased his vessel interests until the firm of Hutchinson & Co. became as well known as any on the lakes. A family man in every sense, of a kindly nature, warm-hearted to a fault, and strictly honest and upright in his dealings, none but good things could be said of the veteran vesselman. The senior member of the firm of Hutchinson & Co., and a power in marine circles, he had been doing business on the lakes for more than forty years. He was born in Oswego, N. Y., came to Cleveland when twenty-five years old.

What is said to be an ingenious method of disposing of the rocks dredged up in the course of improving the channel at Limekiln Crossing and making this material of use in United States government work has been devised by Donnelly Bros., the Buffalo contractors on the Limekiln work. The stone, as it is removed from the bottom of the river, is loaded on scows and sent to Ashtabula, where it plays an important part in construction of the new breakwater building there. This is, of course, all very handy for the contractor at Ashtabula, also, perhaps for the government. It is a discrimination though, against other contractors who have to pay for their stone; again, this rock is actually and properly Canadian territory, is the tariff, duty and everything fixed up on it? and, or, if we can lug away submarine ground, why not capture a slice of the handiest portion that is out of water? The Lake Erie entrance to the Detroit river would be kept in much better condition if under the jurisdiction and territorial control of the United States.

FISH FOOD SUPPLY IN LAKE ERIE.

Experiments of special interest to all students of fish life were recorded in a paper read at the last meeting of the American Association for the Advancement of Science, by Dr. Henry B. Ward, professor of zoology in the University of Nebraska. The stocking of Lake Erie for so many years past with millions of fish caused the question to be raised as to whether there might not be more fish in the lake some of these days than there would be food for. It was Dr. Ward's novel and rather difficult problem to measure approximately the amount of fish fodder there was in Lake Erie. He was assisted in this unpromising task by Prof. Reighard, and the result of their investigations has convinced them that there is evenly distributed through the waters of Lake Erie enough fish food to warrant the fish commission in going on stocking the lake with fish by the millions for years to come. The two scientists had to invent their own appliances. The process consists in raising a net, which has been lowered from a boat, through a straight upward lift of ten meters. A fine gauze net strains the water, the residue of animal life collecting in a tiny trap in the bottom of the net. In the mouth of the net is a water meter, registering the quantity of water tested through an electrical recorder on the deck of the boat, while an electrical registering scale records the weight of the food matter caught in the trap.—Forest and Stream.

TO RAISE LAKE ERIE LEVELS.

An engineering problem which has confronted the United States Engineer Corps for some years has been the accounting for the lowered water levels in all the Great Lakes, except Lake Superior, and to find some practical remedy for the resultant evils. Maj. Thomas W. Symons, Corps of Engineers, U. S. A., widely known as the constructor of the five-mile breakwater at Buffalo, and now stationed at Buffalo, has come forward with a recommendation to the Government of a plan.

His project is to dam the Niagara river at the outlet of Lake Erie and build a ship canal for the vessels which have been using the river. The scheme is the most gigantic and far-reaching which has ever been undertaken in connection with inland waters, and will affect the entire commerce and shore property interests of Lake Erie.

The primary engineering work, the damming of the Niagara river, is not so great a feat from the engineer's point of view, but the matters incident to this work give it its importance.

The undertaking divides itself into three parts, and each will make a big task for the engineers of the army.

The first is the building of the dam, which must be over a mile wide on a variable base, part being shale, part limestone, part gravel, second, the construction of the ship canal, a length of four miles, and third, the avoiding of damages to property along the lake shore and in harbors and rivers, by restoring the lake to its old level.

A study of the chart showing mean monthly levels taken by the United States Engineer Corps since 1860, and prepared under the charge of Major W. L. Fisk, tells the story in a way that cannot be mistaken. It leaves no doubt but that the falling off in the water is due entirely to the deepening of the channel of Niagara river, the opening of the Welland canal and the Chicago drainage canal. The damming of the Niagara channel will go a long way, however, toward overcoming the effect of the other two.

Lake Superior, which is beyond the effect of any of the factors named, has in it to-day water enough to bring the mean level above the sea to 603 feet, while forty years ago it was 602 feet, and in 1879 was 601 feet. From 1880 to 1890 the season fluctuations of the level was almost identical, though that period saw very dry seasons, and very wet seasons, also there was a great quantity of work done in clearing off forests and opening up swamps in the territory drained into it. This is almost proof conclusive that natural and artificial causes affecting the watershed have had little effect on the mean water level.

Lakes Michigan and Huron having a full and uninterrupted connection in the Straits of Mackinac, have, of course, the same level, and during the same period underwent the same influences as Lake Superior, with the added effects of the factors named. The result speaks volumes, and leaves the conclusion obvious.

In 1860 the mean level above the sea was a few inches over 582 feet, and in 1870 was a few inches less, while the annual fluctuations were almost identical. In 1880 there had been a slight increase, and this increase was maintained at nearly 583 feet until 1887-88, when the Welland canal was approaching completion, and then the water began to fall. The chart shows that in 1891 the mean level had dropped four feet, but the next three years saw a recovery of almost two feet, showing that the entire diminution was not due to the opening of the canal, but to seasonable fluctuations.

It was in 1895 that the work was completed which cleared the head of the Niagara river, and gave it an eighteen foot channel. There was taken from the crest of Horseshoe Reef 31,000 cubic yards of rock and gravel. The current here is exceeding swift, and the work was executed with great difficulty. The top of the reef was blasted off for a width of 400 feet in some places, lowering it five feet, in some two. The embedded gravel was dredged out, as were what fragments of rock as were not swept down by the current.

During the time that the opening up of the channel was going on, the level of the lake began slowly dropping, according to the chart, really not more than the seasonable falling off, but it failed to recover in the rise the next year. In 1887-88, at the time of the opening of the Welland canal, it had lost a foot, but now it continued to sink, so that in 1895 its mean level was 571 feet above sea level compared with 574.5 in 1887. Lake Superior had continued to rise meanwhile, and Lake Ontario was holding its own nicely at 246, which was only six inches below what it was forty years before, six inches higher than thirty years before, and a full foot higher than twenty years before. Since that time dredging in the St. Lawrence seems to have lowered the level a few inches.

The major portion of the falling off in the waters of Lakes Michigan, Huron and Erie has come in the past fifteen years. The Chicago drainage canal has been open two years, and there has been a fluctuation of from nine to twelve inches in the three lakes, but it is yet too early to say that it will be permanent, as it remains to be seen whether by June or July of this year the level shall have taken the season's rise sufficient to recover from the fall. It is the fixed belief of Major Symons at Buffalo, and Major Fisk at Chicago, that it will not, and that the following months will see a still greater sinking of the level. It takes months for any such factor as a new outlet to produce its effect on so large a body as one of the Great Lakes.

Since it is palpable that the falling of the levels has been

caused by the canals and the dredging out of the channel of the Niagara, Major Symons has concluded that the remedy is the undoing of the evil. Since that harm to shipping has been almost entirely confined to Lake Erie, and since the Welland Canal affected Lakes Huron and Michigan as it did, he believes that the changing of conditions in Lake Erie will attain the greater portion of the desired ends, and incidentally restore a part of the lost water to Lakes Huron and Michigan, for it is reasonable to suppose that if the lowering of the level of Lake Erie by the Welland canal should so greatly affect the other two lakes, the restoration by damming Niagara would be found in all three.

The raised level would have an effect at the upper entrance of the Welland canal, which the Canadian Government would in all probability meet, and still further aid the project as Canadian harbors and shipping would be equally benefited with American.

The dam would be of rubble stone work, with a long, upper angle and steel anchors on account of the ice and current, and would be about 2,000 yards in length. The beginning at the American shore would be just below the entrance to the Erie basin, and the line of direction would be directly across stream, 400 yards below; the Horseshoe Reef Light to a point on the Canadian shore in line with the historic ruins of Fort Erie. The height is as yet undetermined, but Major Symons thinks it would be sufficient to cause a considerable fall. This would make a beautiful spectacle in the winter season.

The ship canal would, of course, be an essential to allow vessels to proceed down the river, which they could do by means of the canal to the quiet waters of Strawberry Island, and at the head of Grand Island. At the present time along the shore of Fort Porter there runs the Erie canal, with the Black Rock canal beside it, giving access to the sheltered waters behind Squaw Island. The levels are the same, so the ship canal project includes the combination of the two to the end of the Black Rock canal and the widening of the Erie canal from that point on.

Since the canal would be a considerable link, and a good beginning, should the Government at some future time determine to build a ship canal around Niagara on the American side, it would be foolish to limit it to anything less than a size which would accommodate the largest vessels of the high seas. The waterway at the "Soo" barely accommodates some of the largest lake boats.

This canal should be at least 125 feet in width and 25 feet in depth. The Erie canal could be locked into it at the lower end, which would be a considerable improvement in that waterway's western terminal.

TOO MANY NAVAL BUREAUS.

John D. Long, before retiring from office as Secretary of the Navy, realized that there was no hope for the success of his scheme to consolidate the Bureau of Navigation, the Bureau of Equipment and the Bureau of Supplies and Accounts of the Navy Department, and accepted the situation with his usual good grace. This fact developed in the course of his recent statement before the House Committee on Naval Affairs when the chairman stated that some members of the committee were in doubt as to whether the maintenance of naval colliers should be assigned to the Bureau of Navigation or to the Bureau of Equipment. The then secretary replied: "I feel very clearly that it is not desirable to put the colliers under the Bureau of Equipment, as that is really making two Bureaus of Navigation. I would have all the ships under one bureau. To transfer the colliers to equipment really tends toward that diffusion of duties which I have always opposed. I want to concentrate as much as I can. It is true that to-day with these ten or more colliers the crews and captains are civilians. But just as soon as we can get more officers (and you are giving us more officers) we can put naval officers in command. Naval officers ought to command them. During the war they were commanded by naval officers." Speaking of his efforts to effect a consolidation Secretary Long said: "I have tried every year up to this year, when I have abandoned the attempt simply because I cannot carry it through, to consolidate three of our bureaus which, I believe, could perfectly well be consolidated. I think most of you differ from me in that respect, but it leads to a triple expense. However, it is not worth while to refer to this matter, because I am overruled by the committee and also resisted by the bureau officers who do not give up their jurisdiction. It is not only the case of the tail wagging the dog, but three tails wagging the dog."

We must now await the action of William H. Moody, of Massachusetts, who succeeded Secretary Long on May 1st. When Rear Admiral Taylor assumes charge of the Bureau of Navigation, succeeding Rear Admiral Crowninshield, he will have as his assistants Commander Cowles and Lieutenant Commanders Winslow and Niblack. The last two named take the place of Lieutenants Ward and Webster, who have been assigned to staff duty, on the Illinois. Admiral Crowninshield will hoist his flag on the battleship Illinois, as commander-in-chief of the European station. The Illinois will be in perfect condition when she puts to sea. Rear Admiral Melville denies the rumor recently circulated that the vessel was very much out of repair and that her boilers had shown themselves to be poor. The chief engineer of the Illinois reports that the engines of the Illinois are in perfect condition.

ATLANTIC STEAMSHIP MERGER.

Copies of the shipping combine agreements are published. They are called provisional agreements for the acquisition on or before Dec. 31, 1902, of the White Star, Dominion, American and Atlantic Transport Lines. The vendors, Ismay, Imrie & Co., Mills & Co. (Dominion Line), and Messrs. Widener, Griscom and Bernard Baker, receive as a consideration for all their capital stock \$120,000,000, of which \$60,000,000 is preferred stock, cumulative at 6 per cent., and \$50,000,000 common stock, limited to 10 per cent., and also \$50,000,000 in collateral trust 4½ per cent. debentures.

The White Star Line's acquisition is antedated to Jan. 1, 1901, the combine or corporation, as it is termed, taking all the line's profits from that date. The White Star Line shares are exchanged on the basis of 10 times the net profits made by that line in 1901. The arrangement made with the Dominion Line is similar to that made with the White Star Line, but on the net profits for 1900.

The American and Transport Lines are lumped in one valuation at \$34,158,000, subject to \$19,686,000 of the American line's 5 per cent. bonds.

The Leyland Line is valued at \$11,736,000, based on the understanding that "there are or will be outstanding \$4,075,000 in 5 per cent. preference shares and \$2,500,000 in 4 per cent. debentures," which are not included in the purchase price.

The method of payment is as follows:

White Star Line—25 per cent. cash, 75 per cent. preferred at par and 37½ per cent. of the total amount in common at par.

The Dominion Line payment is exactly the same, and the American transport lines get between them \$18,314,000 in preferred; \$915,700 in common; \$15,844,000 in cash, and such further cash as may be required at a rate not exceeding 6 per cent.

The Leyland Line gets \$11,736,000 cash and the remainder in capital stock, and the bonds go to the vendors, who, however, contribute to the operation as working capital \$785,000 in preferred and \$6,634,000 in common stock, and "are to transfer it to the syndicate if and when formed by the bankers, viz., the Morgans, for \$50,000,000 cash, and in full payment for its services the said \$50,000,000 in debentures, and also \$2,500,000 in preferred and \$25,000,000 in common stock."

It is provided that the corporation may take or decline to take any of the lines of which less than three-fourths of their interest shall be delivered by Dec. 31, 1902. The exclusion of one line does not affect the agreement with the others. The vendors agree to use their best efforts to deliver the necessary three-fourths of their company's stock. The agreements would have been broken had not the Morgans formed the original syndicate of \$50,000,000 cash prior to April 30, 1902.

All the purchase prices include the ships building. The White Star owners, though declaring that the line has been carried on entirely at risk of the purchasers since Jan. 1, 1901, agree until the completion of the purchase to carry on the business of the line. For their personal services the sellers "are to be paid such amount in remuneration as shall be fixed by J. P. Morgan, of the City of New York."

The following important clause occurs at the end of the White Star agreement: "Inasmuch as the company is English and domiciled in England, all questions concerning the sellers arising under or pursuant to this contract shall be controlled or decided by English law."

The agreements cover many printed pages and include intricate arrangements anent the White Star's affiliated interests and minute directions regarding valuation.

All questions, in case of dispute, are eventually to be decided by Price, Waterhouse & Co., the London accountants. Ismay, Imrie & Co. bind themselves not to undertake any kind of shipping business for fourteen years.

In the Dominion Line agreement the sellers promise to use the influence of their votes to cause the present directors to resign after the completion of the purchase.

An additional paper, called a builders' agreement, is appended, in which the Morgans bind themselves to give Harland & Wolff all orders for new vessels and all heavy repairs "that require to be done at a shipyard of the United Kingdom. Nothing herein contained, however, shall prevent the purchasers from placing orders for new steamers and repairs at shipyards in the United States." In return Harland & Wolff agree to build no ships for any other firms but those in the combine, except the Hamburg-American Line, provided the orders of the combine keep the builders' works fully and continuously employed. Harland & Wolff receive from the combine the cost of work plus a commission on the cost price, in the case of new ships five per cent., new machinery in old ships 10 per cent., and repairs 15 per cent. This agreement extends for ten years, and is only terminable thereafter by a five-year notice on either side.

A member of the International Steamship Combine is authority for the statement that no overtures have been made recently to the owners of the Cunard Line to bring that company into the proposed combination. The same person also declares that it has not yet been determined in what state of this country the combination will take out its incorporation papers, nor has the corporate title of the company yet been chosen.

THE NEED OF AN EFFICIENT FOG SIGNAL ON SAILING VESSELS.

BY B. B. BIBLER, LIEUTENANT U. S. N.

The following remarks are submitted to mariners in the hope that the great dangers attendant upon fog—the seamen's greatest enemy—may be minimized by the imperative introduction of an efficient fog signal upon sailing vessels. It is earnestly desired that those interested make such comment as they may desire to the Hydrographic Office.

The existing meager and inadequate rules and international laws on the subject make the demand by mariners for an efficient fog signal imperative. It is believed that an efficient fog horn or submarine signal can be produced, or that, failing in this, sailing ships on the high seas should use in fog, mist, or falling snow an explosive fog signal. The expense of any change will at once be considered, but need a vessel of twenty gross tons be required to make the same signal as a vessel of 500 or 1,000 gross tons? Should a fog signal be selected because it is inexpensive or because it is effective? Will a common lantern answer for a lighthouse?

Article 15 of the International Regulations for preventing collisions at sea provides that a sailing vessel of twenty gross tons and upward shall be provided "with an efficient fog horn to be sounded by mechanical means, and also with an efficient bell." This article does not give the slightest indication as to what is to be regarded as an efficient fog horn. Is the present fog horn in use on board sailing vessels efficient—that is, does it give a timely notice of the presence of a ship in a fog? It is believed that the captains of vessels of various nationalities will say that the fog horns which pass the inspectors, and therefore conform to the above law, are not efficient, in that they do not prevent collisions in a fog. This state of affairs should not exist, and it lies with mariners, ship owners, underwriters, and the public in general to insist upon a change in the regulations respecting fog horns.

In the case of a steamer meeting a sailing vessel end on, or nearly end on, no matter what the steamer's speed may be, there is now no possible way, with the present fog horn, for the vessel under sail to make her presence known until all time for caution is past. An incident has been cited—and it is only an illustration of many similar cases—where a steamer and a sailing vessel collided in a fog. The steamer's whistle was heard on board the sailing vessel for twenty minutes before the collision, although those on board the steamer heard nothing. In the case of a steam vessel going at "moderate speed" and navigating with caution, the usual noises on board ship and those made by her moving through the water are considerable, and the effectiveness—efficiency—of a fog horn should be judged by the conditions which exist now, and not by the conditions existing fifty years ago. What was effective fifty years ago is not necessarily effective now.

Investigation and experiments have shown that the ordinary steamer moving at full speed will stop, after suddenly reversing her engines, in from four to five times her length, and when moving at "moderate" speed this is reduced but little. If the helm is put hard over the instant the engines are reversed, the vessel will have moved ahead about three times her length before stopping, and the ship's head will have changed about four points. These conditions exist in quiet weather and smooth sea. In a vessel of 500 feet length, the distance advanced will be 1,500 to 2,500 feet, or ¼ to 2-5 of a mile, during the time from reversing the engines until the vessel is stopped. Those who are familiar with thick fogs and the present "efficient" fog horn in use on sailing vessels will realize the uselessness of stopping only after this distance has been covered, to say nothing of that covered by the sailing vessel, in the case of meeting end on. In many straits, channels, and other localities, owing to strong currents and other conditions of navigation, large steamers and vessels must move at considerable speed, and the fog horn of a sailing vessel must be effective or collision is unavoidable.

Mariners should not insist on the infallibility of their ears, but keep in mind the fact that sound is not always with the same intensity in all directions from its source. Some curious phenomena may be related in regard to fog signals; and experiments with the fog signals of light-houses have shown that, though the fog signal was in full operation, and that while there was no lack in the volume of the sound emitted by the signal, the sound was heard at some distances and was not heard at others, or was indistinctly heard where it should have been heard loudly, and loudly heard where it should have been heard indistinctly; in fact, at some points near by, the signal could not be heard at all—all this within reasonable earshot. A siren on the Atlantic coast has been heard eighteen to twenty miles to windward in northeast gales, and a much less distance to leeward. Whatever the theory, whether there is a soundless zone, whether these phenomena are due to different densities in the strata of air or fog, or whether there is some other reason, the fact remains and is cited for the information of the mariner.

It is also difficult to determine the true or exact direction of the source of a sound which reaches the ear. A number of cases are on record where officers on the bridge of a vessel have differed as much as from five to eight points in their estimation of the exact direction of a fog signal, and collisions have occurred in consequence of such errors.

Caution should be observed in a fog even with an efficient fog horn.—May Hydrographic Office Chart.

FASTEST SHOAL WATER BOAT.

THE ROBERTS SAFETY WATER TUBE BOILER CO., 39 and 41 Courtland St., New York, May 9, 1902.

THE MARINE RECORD, Cleveland.

A few days ago we noticed in the last issue of your publication, an item from Detroit, in reference to the steamer Tashmoo being the fastest vessel in shoal water on the Great Lakes.

While this subject is under consideration, we beg leave to submit the enclosed copy of a letter which we have this day received from Mr. John Craig, in reply to a letter of ours written a few days ago, and enclosing said clipping from THE RECORD.

Our recollection was that the Iroquois not only beat the Tashmoo last summer, under very unfavorable conditions, but that she went through the river ahead of her with her masthead decorated with brooms.

We have a recollection of seeing an account of this in one of the papers published in the locality.

We trust that the enclosed copy of the letter from Mr. Craig will convince you that the Tashmoo is not the fastest boat on the lakes in shoal water, and that you will give the matter consideration.

THE ROBERTS SAFETY WATER TUBE BOILER CO.

The letter referred to is as follows:

CRAIG SHIP BUILDING CO., Toledo, O., May, 7, 1902, ROBERTS SAFETY WATER TUBE BOILER CO.,

GENTLEMEN:

With regard to the clipping from the MARINE RECORD, will say you are right, in regard to the speed of one of the boats, fitted with Roberts water tube boilers, namely the Iroquois. This steamer beat the Tashmoo all the way across Lake St. Clair, the second time the Iroquois was ever away from the dock, and before we had time to work her down at all. As you will remember Mr. Arnold was in a great hurry to get her up to Mackinac, and did not give us time even to run her here at the dock, any more than to see that she would run. We started here for Mackinac, and, as luck would have it, the Tashmoo picked us up, at the entrance of Lake St. Clair, when we only had two boilers in use. We managed to stay ahead of her, however, until we had steam, on the other two boilers, and then we left her fully half a mile in the balance of the run across the lake. This certainly does not speak very much for her excessive fast speed, in shallow water, as there is only 18 feet of water across the lake, and the distance is only 16 miles across it.

Yours very truly,

THE CRAIG SHIP BUILDING CO., J. F. CRAIG.

EASTERN FREIGHTS.

Messrs. Funch, Edye & Co., New York, report the condition of the Eastern freight market as follows:

The only direction in which any activity in chartering has been manifested is for timber from the Gulf and deals from the British Provinces. The rates in some instances show a slight advance, but in view of the number of steamers chartered during the last few days, shippers do not feel inclined to make further commitments unless owners are disposed to allow some concession. Grain shippers are still unable to operate for full cargo steamers, but as the price of cereals has fallen somewhat, it is quite possible that some business in this commodity may develop shortly. Some few fixtures have been effected for coal to Mediterranean ports, and further charters could probably be consummated on the basis of last transactions. There is no enquiry for cotton tonnage either from the Gulf or South Atlantic ports.

The market for sail tonnage remains stagnant. Vessels apparently are not wanted, and in exceptional instances, where business has been accomplished, unremunerative rates have prevailed.

Grain, Liverpool or Glasgow 3 cents; London 3½ cents; Bristol 4½ cents.

STATEMENT OF THE VISIBLE SUPPLY OF GRAIN.

As compiled by George F. Stone, Secretary Chicago Board of Trade Saturday, May 10, 1902.

| CITIES WHERE STORED. | WHEAT. Bushels. | CORN. Bushels. | OATS. Bushels. | RYE. Bushels. | BA LKY Bushels. |
|-------------------------------|-----------------|----------------|----------------|---------------|-----------------|
| Buffalo..... | 614,000 | 135,000 | 132,000 | 149,000 | 349,000 |
| Chicago..... | 5,461,000 | 3,819,000 | 757,000 | 608,000 | 11,000 |
| Detroit..... | 112,000 | 15,000 | ..... | 21,000 | ..... |
| Duluth..... | 9,962,000 | 43,000 | 7,000 | 91,000 | 105,000 |
| Fort William, Ont. | 2,823,000 | ..... | ..... | ..... | ..... |
| Milwaukee..... | 332,000 | 9,000 | 71,000 | 24,000 | 97,000 |
| Port Arthur, Ont. | 205,000 | ..... | ..... | ..... | ..... |
| Toledo..... | 38,000 | 226,000 | 237,000 | 91,000 | ..... |
| Toronto..... | 60,000 | ..... | 13,000 | ..... | 4,000 |
| On Canals..... | 332,000 | 69,000 | 137,000 | ..... | 20,000 |
| On Lakes..... | 1,280,000 | 699,000 | 334,000 | 152,000 | ..... |
| Grand Total.... | 35,302,000 | 5,667,000 | 2,917,000 | 1,346,000 | 813,000 |
| Corresponding Date, 1901..... | 45,716,000 | 17,338,000 | 11,449,000 | 963,000 | 719,000 |
| Increase for week..... | ..... | ..... | ..... | ..... | ..... |
| Decrease " "..... | 3,026,000 | 576,000 | 13,000 | 265,000 | 180,000 |

While the stock of grain at lake ports only is here given, the total shows the figure for the entire country except the Pacific Slope.

SHIPPING AND MARINE JUDICIAL DECISIONS.

(COLLABORATED ESPECIALLY FOR THE MARINE RECORD).

Negligence.—There can be no recovery from a charterer for injuries to the vessel, without proof of negligence. W. H. Beard Dredging Co. vs. Hughes et al., 113 Fed. Rep. (U. S.) 680.

Injury to Chartered Vessel—Liability.—A charterer is liable for an injury to the chartered vessel through the negligence of a company which he hired to tow the same. W. H. Beard Dredging Co. vs. Hughes et al., 113 Fed. Rep. (U. S.) 680.

Admiralty—Evidence in Suit for Collision—Admissions of Master.—Statements made by the master of a vessel, after a collision, as to the manner of its occurrence, are receivable as admissions against the owners in an action against them for the collision. The Severn, 113 Fed. Rep. (U. S.) 578.

Shipping—Damages for Breach of Charter—Sale of Vessel Before Expiration of Term.—Where a dredge and three scows, to be used in connection therewith, were chartered for a minimum term of three months, but were returned and the dredge was sold by the owner before the expiration of the term, the charterer is not chargeable with the hire of either vessel as damages for breach of charter after the date of such sale. W. H. Beard Dredging Co. vs. Hughes et al., 113 Fed. Rep. (U. S.) 680.

Pier Rights—Sale—Consideration.—An application for the lease of pier from the New York City dock department did not vest any property right in the applicants which could furnish consideration for their sale of the pier, or an interest therein, made just prior to a sale of the lease at auction to the highest bidder, who was entitled to the lease, whether he had filed application therefor or not. Coverly et al. vs. Terminal Warehouse Co., 75 N. Y. Supp. 145.

Salvage—Compensation—Rescue of Stranded Ship.—Salvage service performed by a wrecking tug and barge equipped expressly for the service, and having a crew of thirty men, by which a steamship stranded in a dangerous position on the coast was promptly and skillfully rescued without injury to herself or cargo, held to entitle the salvors to an award of 5 per cent. on the amount saved, the value of ship and cargo being \$153,000 and pending freight about \$4,000. The James Turpie, 113 Fed. Rep. (U. S.) 700.

Suit on Charter—Pleadings and Issues.—A libel by a shipowner against a charterer to recover charter hire gives the admiralty court jurisdiction over the entire contract, and it will inquire into all its breaches, and award all the damages suffered thereby, although such breaches were not all specifically alleged in the libel, but some occurred after it was filed. A libel to recover charter hire for a month in advance, where the charterer re-delivered the vessel within the month, sufficiently raises the issue as to when such re-delivery was made. Gow et al. vs. William W. Brauer S. S. Co., 113 Fed. Rep. (U. S.) 672.

Extinguishing Fire in Barge—Amount of Award.—A wooden barge, valued at from \$40,000 to \$50,000, laden with a cargo of coal worth about \$10,000, took fire while lying in harbor, near a pier. There was no fire boat in the harbor, and the barge could not use her own fire apparatus, owing to the location of the fire. In response to her signal, four tugs, which were all that were within reach, each fully equipped with fire apparatus, came to her assistance, and rendered prompt and efficient service. After three or four hours work, the barge was scuttled on orders from the master of one of the tugs, and lay aground, with a free board of five or six feet amidships at high tide. The tugs continued to throw water into her for some thirty hours before the fire was extinguished, and then two of them pumped her out, one of them working for over three days in all. Through their efforts there was a saving of damage on barge and cargo, of from \$20,000 to \$25,000. Held, that they were entitled to an award for salvage services of \$4,000. The Independent, 113 Fed. Rep. (U. S.) 702.

Action for Death of Ship Captain—Contributory Negligence—Ship Canals.—On a clear but dark night the steam tug of which plaintiff's intestate was captain entered a 300-foot wide ship canal from the south end, running at proper speed and at proper position over towards the east pier. About the same time defendant's steamer and tow, connected by a 1,000-foot hawser, entered the canal from the north end; the tow shifting across to the east pier, so that steamer, tow, and hawser swept the whole channel. As the tug approached, the steamer signaled her to pass to port, which she did; and the hawser swept off her upper works, killing intestate. It appeared that intestate signaled his engineer to stop, and that the tug could have been stopped in three or four lengths, but the evidence as to whether he gave any signal to back was very doubtful. Held, that in the absence of any evidence as to when the danger became apparent to intestate, or as to whether a signal to back would have averted the accident, the question as to whether intestate was guilty of contributory negligence should have been submitted to the jury. Hackett vs. Wilson Transit Co., 89 N. W. Rep. (Mich.) 360.



DEVOTED TO NAVIGATION, COMMERCE, ENGINEERING
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CLEVELAND, O., MAY 15, 1902.

RIVER AND HARBOR LINES.

At, on, or about the time a river or lake port begins to
show a volume of commerce, the most valuable frontage,
reclamation and riparian rights are held in possession.

The next step is to importune Congress for an appro-
priation of certain moneys to be expended in facilitating
the general commerce of the port or locality. The Chief
of Engineers, Corps of Engineers, U. S. A., is then called
upon for a report, and he in turn must receive the assent of
the Secretary of War, to cause preliminary examinations
and surveys to be made, also estimates of the projected
improvements, etc., the same to be submitted to a Board of
Engineers, and thence through the Chief Engineers to the
Secretary of War, to be later placed in the hands of Con-
gress.

By this time, the port has already loomed into a district
of commercial importance (as witness the number on each
lake during the past decade) and riparian rights, fore-shore
privileges, etc., are brought under consideration.

It may be understood that at all ports there is what is
known as an inner and outer harbor, the lake limit of the
former furnishing the inner or shoreward line of the latter,
this feature, coupled with riparian and in some cases squat-
ter's claims, holds the lake front property in the vicinity of
the harbor, in continual and long drawn out litigation.

The inner harbor, its conservancy and improvement, rests
with the municipality, and is a distinctly local feature, the
outer harbor is, for the same purpose, under Federal juris-
diction. The argument which we seek to bring forward in
this connection is the advisability of the outer limits at the
inner harbors being fixed and delineated prior to any claims
being made on Congress, as it is stated that encroachments
have been made and buildings erected, etc., on what was
formerly considered Federal improvements.

There can be no good reasons advanced in support of
delaying preliminary surveys, while there is much to be
said in favor of establishing harbor limits, especially in
those localities where there is a prospect or probability of
improvements being required in the future.

It is well understood that the Corps of Engineers, U. S.
A., are now more than ever, a well worked, busy, scientific
arm of the government, at the same time there might be
sufficient talent at occasional leisure at disposal to lay out
the lakeward lines of all probable harbors, and, even should
a modification of these lines be found of advantage in the
future, with good reasons adduced therefor the change

could be brought about in due course after a final survey
had been made, and estimates placed before the River and
Harbor committee for action thereon to be taken by Con-
gress.

"WIND velocity and fluctuations of water level on Lake
Erie," is the title of a pamphlet just received from the De-
partment of Agriculture, Weather Bureau, prepared under
direction of Willis L. Moore, Chief U. S. Weather Bureau,
by Alfred J. Henry, professor of meteorology. It is with
some degree of satisfaction that we note the attention now
being paid to the meteorology, hydrography and general
physical geography of the lakes, and prevailing local condi-
tions. The Weather Bureau in particular is deserving of
commendation for its active, technical and scientific re-
searches in the interest of the foregoing.

IN VIEW of the increased commerce from the lakes via
the St. Lawrence route, it is gratifying to learn that the
Dominion government intends to pursue its investigations
relative to Gulf and costal tides and currents in that vicin-
ity. We have excellent authority for stating that the action of
the currents and dangerous indraught off Cape Race will be
closely observed by the highly skilled and trained scientists
now in the service of the government. The work along
these lines now in hand is unquestionably of the greatest
maritime and commercial importance to Canada, and meas-
urably so, to the citizens of the United States.

THE thanks of THE RECORD are due Hon. E. A. Bond,
State Engineer and Surveyor, Albany, N. Y., for a copy of
his annual report for the fiscal year ended September 30,
1901, as transmitted to the Legislature of the State of New
York, January 22d, 1902.

MORE HYDROGRAPHIC WORK.

Capt. Southerland, U. S. N., chief of the Hydrographic
Office, has been deeply interested in the physical changes
reported to have taken place in the Antilles as a result of
the earthquakes and volcanic outbreaks, and he is planning
to undertake immediately, with the approval of Admiral
Bradford, U. S. N., a series of hydrographic surveys. If
the current reports as to the tremendous subsidence of the
sea bottoms near the Antilles are accurate, then there un-
doubtedly have been corresponding upheavals of the bot-
tom in other sections which have created great menaces to
navigation through the fact that they are not charted.

Capt. Southerland points to a curious fact, namely, that
a year ago there was what might be regarded as a promon-
itory sign of the tremendous disturbance which has just
taken place in the earth's crust. The "Notice to Mariners,"
of June 8, one year ago, contains the following note:

"Capt. Thomas, of the schooner Kate, reports that May
5, about 3 miles eastward from the south point of Martin-
ique, the sea rose with great fury, breaking as if on rocks.
This continued for about four hours; then the sea became
quite smooth again. The schooner labored very heavily,
sustaining slight damage, and was uncontrollable during
the phenomenon, the light airs from the southeast not giv-
ing her steerage way. No current was observed. The
weather was fair."

THE SHIPBUILDING INDUSTRY.

The Census Bureau has issued a report on shipbuilding
and repairing in 1900. It shows a capital of \$77,362,701,
invested in the 1,116 establishments, reporting for the in-
dustry. This amount does not include the capital stock
of any of the corporations. The value of the products is
returned at \$74,578,158, involving an outlay of \$2,008,537
for salaries of officials, clerks, etc.; \$24,839,163 for wages;
taxes, etc., and \$33,486,772 for materials used, mill supplies,
freight and fuel. The report says:

In 1900 the tonnage under American registry was only
826,694, showing a loss of 461,631 tons since 1890, a shrink-
age double the total new registered tonnage built in the
United States during the decade.

The number of shipbuilding establishments, from 1850
to 1900 increased 17 per cent., while the capital invested in-
creased 1,340 per cent.

During the same period the average number of wage
earners increased 261 per cent., and the total value of con-
struction and repair 340 per cent. The average capital
invested in the eight navy yards of this country is \$6,785,-
064. At all the shipbuilding establishments in the coun-
try, from 1890 to 1900, the average capital invested per
establishment increased 129 per cent.; the average wage
earners, 55 per cent., and the average product of the es-
tablishment increased 59 per cent. The following states re-
ported either a capital of products of more than \$1,000,000
each: California, Connecticut, Delaware, Illinois, Maine,
Maryland, Massachusetts, Michigan, New Jersey, New
York, Ohio, Oregon, Pennsylvania, Rhode Island, Vir-
ginia, Washington and Wisconsin. The report says it is
probable that the contest for primacy in shipbuilding during
the next decade will be between the Delaware river and
the Chesapeake Bay districts.

UNIVERSITY OF WISCONSIN.

Summer School for Apprentices and Artisans, con-
ducted under the auspices of the College of Engineering.
Second summer session, June 30, August 8, 1902. This
school is intended primarily, to give to stationary engi-
neers, superintendents of power stations, machinists, ar-
tisans, and apprentices in various trades, such mathemat-
ical, laboratory, and shop instruction as would be found
of most practical value to persons in these employments,
and which could be imparted in the limited time of six
weeks.

Any person over sixteen years of age, speaking the Eng-
lish language and having a fair knowledge of arithmetic,
will be admitted. The school has a faculty of ten, com-
posed of regular professors and instructors from the
faculty of the College of Engineering.

Correspondence school students will find the opportuni-
ties for laboratory and shop work here offered particularly
helpful.

In case the classes of practical workers named above do
not furnish all the students which can be accommodated,
others will then be received as follows: Regular students
in the College of Engineering who wish to do their shop
work during the summer school; persons who wish to
qualify themselves to teach manual training in high
schools; and high school students who wish to get manual
training practice.

The tuition fee for the term is fifteen dollars for all
courses. In addition to this there are laboratory fees of
five cents per hour for all time spent in such practical
work.

Courses of instruction are in The Use of Formulae,
Applied Electricity, Mechanical Drawing, Transmission of
Power, Steam Engineering, Strength of Materials, Shop
Work in Carpentry, Forging, and Machine Tools.

For a more detailed description of the work given, in
these courses, and for other information concerning this
summer school, send for Bulletin No. 44, to J. B. John-
son, Dean of the College of Engineering, Madison, Wis.

This is an effort on the part of the regents of the State
University and of the faculty of the College of Engineer-
ing to do what lies within their province in the great field
of industrial education. The school was started last
year as an experiment, and has proved eminently success-
ful, as shown by the personal endorsements of some of
those who took the courses as given in the accompanying
four-page circular. This school is not self-supporting,
as the fees pay but a small portion of the expenses; the
remainder is paid out of the general University funds.

ABLE RIVER PILOTS.

Everybody knows about the pilots of the ferryboats
on the North and East rivers, who, whatever the wind
and whatever the state of the tide, bring their boats into
their slips trip after trip with such nicety of handling that
you can scarcely tell when the big boat strikes the bridge.
But there are other pilots on the Harlem and Hudson
rivers who do remarkable work of this sort, too, of whom
very few people hear; the same being the pilots of the
big tugboats that haul down the great floats with railroad
freight cars.

Up the narrow Harlem, from the East river, comes the
big tug with two great unwieldy floats, each carrying eight
or ten cars, lashed one to either side. Big as she is
she looks small, and she is small, as compared with the
long, wide, blunt-ended floats.

But the tug has got the power, and the man at her wheel
knows how to handle it; and, whether the tide is ebb or
flood, or whatever the wind may be he brings the two
great scows up the narrow river, and puts 'em in the slips
where they belong just as nearly and surely as he would
put himself in there alone. The river is so narrow that
a man can't come at the slips straight from open water in
front, but has to come up and stop and turn and work
his way in. But this he does in a manner to command ad-
miration.

With those two great, bulky barges lashed to him he
comes up the river to pretty nearly opposite the ends of
the slip, coming along just as quietly and easily as can be,
and then he begins manipulating his tow to get it headed
around toward the slip. You can hear from where you
are standing on the bridge over the river, every now and
then the deep, sonorous sound of the engine room gong,
as the man in the pilot house pulls on the finger-hold,
and instant with the sound of the gong comes the churning
of the water under the tug's stern, as the screw is turned
in answer to the signal; for the man in the pilot house
and the man in the engine room work together.

There's no hurry or worry about it all, but to the accom-
paniment of an occasional musical gong strike or two, and
the churning of the tug's propeller, you see the two great
floats with the tug between them turning steadily, and then
before you know it two floats are going in.

With the floats secured at the shore and the tug casts
loose and backs out clear of them into the stream, and
then for the first time the folks looking on see what sort
of boat she is. Before that about all they had seen of her
was her smokestack and pilot house rising above the roofs
of the cars on the floats, but now here she is, with no gin-
gerbread work about her, but an able boat and with a
steamboat man in the pilot house.

TO "WHIZ" ACROSS THE ATLANTIC.

AN OCEAN GREYHOUND WITH STEAM TURBINES, WATER-TUBE BOILERS, USING OIL AS FUEL—80,000 HORSE-POWER—30 KNOTS AN HOUR.

Mr. H. E. J. Camps, of the London firm of Camps & Piercy, consulting engineers and naval architects, has designed an Atlantic liner capable of beating the trans-Atlantic record by almost two days. During the last few years the success of a few of the English types of water tube boilers has become assured, and, owing to the vast strides made in the design and construction of steam turbines, this form of engine is now well within the range of practicability. Mr. Camps has taken advantage of this great advance, and the steamer which he has designed he proposes working with turbine engines supplied with steam by water tube boilers. By using oil as fuel he will save weight and space. Oil will be carried in the double bottom of the ship, underneath the boilers.

"The speed of my vessel" says Mr. Camps, "will not be less than thirty knots an hour, more than six knots faster than the swiftest liner afloat. This is got without sacrifice of strength or stability.

"This speed will shorten the Atlantic passage by at least a full day, the record being about five and a half days, while my steamer will do it easily in four and a half. By taking the proposed route of the Canadian fast Atlantic service, the greater part of another day can be knocked off, enabling a busy man to get from capital to capital in less than four days.

"My steamer is over 700 feet long—about the same length as the Oceanic. To drive her at the stated speed the huge installation of 80,000 horse-power has been decided. This is more than double the horse-power in any existing or proposed Atlantic greyhound. That of the Oceanic is 28,000 and that of the Deutschland, the Hamburg-American crack, 35,600.

"In spite of this I am able to save more than 50 per cent. in the weight of the machinery and boilers over the ordinary type of liners.

"The boat will not only be the fastest vessel afloat, but the neatest.

"The present would be the best opportunity for the Canadian Government to step in with its fast line, so long suggested. I am willing to place my services at the disposal of Canada and to give the Dominion Government the benefit of my ideas.

"This would enable them to checkmate the operations of any hostile trust, and to annex the passenger traffic of the North Atlantic by feeding the United States through Canadian ports, the reduction in the time occupied for the journey being sure to prove irresistible to the great majority of passengers."

Mr. Camps is a level-headed, experienced man. He had his early training with the great firm of Harland & Wolff. For several years he was with Palmers, of Jarrow, and he has also had experience in northeast coast yards. He occupied a high position in the firm of Sir Raylton Dixon & Co.

MISSISSIPPI VERY LOW.

There is a disposition in some quarters to poke fun at the Mississippi for failing to rise to the occasion this spring. The Father of Waters is so low that the captains of the fleets of steamers that ply its bosom have concluded to tie up somewhere between St. Paul and St. Louis. A suggestion comes in from one corner of wagdom, that if kept well sprinkled the river bed might be used for a boulevard. From another comes the weird hint that if worst comes to worst traffic between St. Paul and Winona could be conducted by stoneboat. And from still another that a river should have no trouble to get aboard the "water wagon."

In the meantime, the once majestic stream refuses for goods reasons to lash itself into a fury, but quietly runs away from the issue, stung, no doubt because of the failure of Jupiter Pluvius to come enthusiastically to its rescue, though silent, serene and scornful of its detractors.

There is, however, a serious side to the river problem, both as to the Mississippi and its tributaries, the St. Croix and the Rum. Seldom in the history of the Northwest has there been so little water in the streams of this section. Not only the big lines which run between St. Paul and St. Louis, but the lumber steamers as well find too little water in most instances for their craft, and so are obliged to lie to from very force of circumstances until hoped-for spring freshets bring a sufficient flow to make navigation safe. Moreover, all of the log drives northward as far as Grand Rapids, are hung up indefinitely as there is no where water enough to saturate logs without immediate and constant danger of a jam. There is, too, only slight prospect of relief. Most of the snow of the highlands—and there wasn't much of it—has melted without appreciably helping the water courses into which it has flowed. The hope of both the logger and the steamboat man is in heavy, continuous rains.

ONE of the most respectable and generally accepted theories of the weather is exploded in an article in the June Scribner's, called "The Gulf Stream Myth and the Anti-Cyclone," by Harvey Maitland Watts, who is an acknowledged authority. Every one interested in the weather can follow with interest Mr. Watts' clear exposition.

LAKE FREIGHTS.

The features of the freight market for the week have been a steadiness in the ore rates, a slight advance in Chicago grain rates, and a 5 cent reduction on coal from Ohio ports. Lumber is moving steadily at former quotations.

Iron Ore.—There is no change in freights, and tonnage meets with regular chartering at season rates, from which there is no departure. Grain.—The latest Chicago quotation is 1¼ cents on corn, being a 1½ cent advance from last week, and a better rate held for, especially for cargoes up the South branch of the river. Duluth offered 1¼ cents, a reduction of ½ cent, with but few takers, as that rate is only equal to 65 cents ore. The Erie canal grain traffic is fairly brisk at 4 cents on wheat, 3½ cents corn, and 2¾ cents for oats.

Coal.—There is a slump of 5 cents on coal from Ohio ports to Lake Superior, the Lake Michigan rate still holds at 45 cents. Buffalo rates are nominal, with little or no chartering. This, of course, accounts for the 5 cent reduction in Ohio rates. There is trouble in sight for Milwaukee coal men, in the anthracite strike. Milwaukee is one of the greatest anthracite receiving ports on the lakes, and handles from 1,000,000 to 2,000,000 tons a year. There is now but 100,000 tons of anthracite on the docks there, and the strike in Pennsylvania will still further, if not totally, shut off receipts.

Lumber.—Chartering in the lumber trade is light, but rates hold steady all around. The longshoremen's strike at the head of Lake Superior hung up a number of lumber carriers, and the boats are slow in getting around. In any case, a large quantity of the seasoned lumber has been sent forward, and carriers will have all that they can do to hold the freight rate steady for the next sixty days.

TO PENSION LIFE SAVERS.

Representative Lovering, of Massachusetts, introduced a bill creating a retired list for district superintendents, keepers and surf men, of the Life-Saving Service. It provides that after they have served 30 years they may make application for retirement, and thereafter receive 75 per cent. of their salary. It further provides that when the board, created by the act, finds that an officer or surf man is incapacitated for active service, as a result of accident or infirmities of age, he may be retired and receive three-fourths pay. This bill was advocated by President Livingstone, of the Lake Carriers' Association, during his recent visit to Washington, it has been endorsed throughout the country, and by the press generally.

NOTES.

A VALUABLE supplement to the monthly pilot chart for the Atlantic coast has been added by Commander Southerland, U. S. N., Hydrographer, devoted to a uniform system of buoyage, as adopted by the several maritime nations. This supplement, which is in the form of a chart, shows in colors the types of buoys used for different purposes by each nation, the buoys being pictured by well-colored illustrations, arranged in columns. This supplement will be of considerable value to navigators among the islands off our Atlantic coast, and adds much to the value of an already unusually valuable publication.

THE Providence Journal, of April 27, contains a description of the yacht Weetamoe, now building for Mr. H. F. Lippitt, at Lawley & Son's yard, South Boston, Mass. The boat is plated throughout with Tobin bronze, and a new feature is the fastening of 22 frames of that reliable metal in the midship section for the purpose of overcoming galvanic action. Great care has been taken in riveting the Weetamoe to eliminate as far as possible galvanic action produced by metals dissimilar in character coming in contact where the greatest dampness is expected. It is expected that the yacht will be finished with bright topsides, and those who have seen her say she will be the finest bronze boat ever turned out by the builders.

MESSRS. LEWIS & CRANE, Seattle, Wash., state that the demand for Pacific coast lumber is unprecedented; mills are all full of orders, which is made evident from advances in prices. It is a common habit of buyers to put off ordering until the last moment and then ask immediate shipment. Better take time by the forelock and place orders for material in advance of needs, and avoid possible delays. They also say their facilities are better than ever for furnishing anything in Pacific coast lumber, making a specialty of heavy and long timber, dock or shipbuilding lumber in Washington fir or Oregon pine.

A LESCHEN & SONS' ROPE CO., St. Louis, Mo., manufacturers of wire rope and cordage of every description, have issued a new catalogue which is fully illustrated with all specialties, wire, steel wire, Swedish iron, crucible cast steel, and special steel rope for hoisting, transmission and haulage. These are made with any combination of wires to order. The firm claims that flattened strand ropes have 150 per cent. more wearing surface than ordinary ropes. The firm also make tiller and mast arms, galvanized iron and steel wire ropes and hawsers, hooks and couplings, shackles, thimbles, turn-buckles, chain, steel and malleable and wrought iron blocks, sheaves and grooved wheels, etc. The firm is also the inventor of Leschen's patent automatic aerial wire rope tramway for the long transmission of merchandise, ore, coal, logs, etc. Parties interested should write for a copy. The company has branch houses at San Francisco, Cal., Chicago, Ill., and New York City.

LAKE SUPERIOR—COPPER RELICS.

One of the greatest finds of copper relics on the historic shores of Lake Superior, has been made by Mrs. Dan Washburn, wife of the proprietor of the summer resort at Portage Lake ship canal, about 10 miles from Hancock.

The discovery included about 75 pieces of tempered copper, relics of the lost art known only to the ancients.

Among them are 25 needles used by the aborigines to sew hides. They have sharp points, but have no eyes. The assortment includes half a dozen fish hooks, both double and single. There are arrow heads and knives of the tempered metal, and several small pieces whose uses cannot be imagined. All are corroded from being buried in the sand for ages.

The locality is rich with prehistoric relics of this kind. Many have come to light during the widening of the ship canal by the government in the past few years.

Last fall two valuable copper axes were found in the sand in the big cut near the shores of peerless Superior. They were dulled and corroded with antiquity. That point seems to have been a rendezvous for the lost race, whose only trace are the mounds and relics. Isle Royale, near the north shore of Lake Superior, where the prehistoric race mined for copper, is less than 50 miles distant.

It is the theory of savants that the lost people who sought copper metal on Lake Superior came from Mexico, where the art of tempering the metal was known. Copper horseshoes were used in the land of the Montezumas. It is supposed that the navigators followed the Mississippi and Wisconsin rivers to this region in search of the metal. Their modes of mining were very primitive. The rock with the metal crops out at the surface on Isle Royale. The ancients who left traces of their primitive methods on the island built fires on the copper laden rocks on the surface, and when they became hot threw cold water on them to break them to pieces.

Some family traditions have been handed down among the Irish miners who came to the Lake Superior mining districts at an early day from the copper mines at Bearhaven, county of Cork, on the Emerald Isle, that the stone hammers of the ancients, found to this day on Isle Royale, are similar to the stone hammers found in earliest times at the Bearhaven mines on their native sod, and credited to the Phœnicians, the earliest navigators in the world's history, who mined for tin in Cornwall and for copper in Ireland.

This is credited as being in the bronze age, when copper was mixed with other metals to produce bronze. Dennis Coughlin, the late Capt. Phillip Sullivan and the late Michael Finnegan, of Hancock, are among those who saw the stone relics in Ireland and on Lake Superior, and gave their opinion that the implements were made by the same race of men. This would point to the fact that the Phœnicians were the adventurers who visited these shores in ancient times in search of the red metal.

LETTERS AT DETROIT MARINE POST OFFICE.

To get any of these letters, addresses or their authorized agents will apply at the general delivery window or write to the postmaster at Detroit, calling for "advertised" matter giving the date of this list and paying one cent.

Advertised matter is previously held one week awaiting delivery. It is held two weeks before it goes to the Dead Letter Office at Washington, D. C.

| | |
|----------------------------|---------------------------|
| Anderson, Allen P, J W Moo | F. B. DICKERSON, P. M. |
| Bersse, J, R Rhodes | Marsh, Mrs. W E |
| Cheesman, Dennis, Saginaw | Mullen, Bartram, Mariska |
| Corman, Joseph | McKay, Angus G |
| Derush, Eli | McKay, Angus G |
| Dewstoe, C C | McMaster, F |
| Ellis, Geo, C A Eddy | McCannel, Jas |
| Elliott, Joe | Osier, Wm |
| Grist, Barney | Olsen, James, McDougall |
| Gunderson, Gus | Peterson, Wm 3, Mather |
| Knapp, H E, Holland | Richelieu, Frank E |
| Knox, Harry | Spirlburg, Herman |
| Lindsay, Robert | Stone, David W, Elfinmere |
| Lake, Fay B | Walsh, John F, Joliet |
| Martin, John | Wood S S |
| Murry, James H | Wise, G M |
| Mitchess, J W | Wheeler, Wh |

F. B. DICKERSON, P. M

MARINE PATENTS RECENTLY ISSUED.

699,144.—Means for cleaning ships' hulls. Walter S Burt, Albany, New South Wales, Australia.
699,231.—Boat. James P. Pool, Brooklyn, N. Y.
699,356.—Coupling for ships' propeller-shafts. William W. White, New York, N. Y., ancillary executor of John Verity, deceased.
699,450.—Device for correcting compass errors. Jorgen Christensen, San Francisco, Cal.
699,451.—Hydraulic steering mechanism, Jorgen Christensen, San Francisco, Cal.
699,518.—Tackle-block. Edgar B. Hammond, New Bedford, Mass.
698,573.—Marine railroad-car transport. William W Smith, Kansas City, Mo.
698,582.—Propeller-wheel. Edward E. Strothman, West Superior, Wis.



A TRUSCOTT BOAT

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WHY TRUSCOTT
BOATS EXCEL.

Truscott Boat Mfg. Co.,
ST. JOSEPH, MICH.

LIQUID FUEL FOR SHIPS. *

The subject of this paper is not in any sense new. The use of liquid fuel has been known for many years to be mechanically possible, and the Transactions of this Institution contain many important references to the question. The late Admiral Selwyn was an enthusiastic advocate and an eloquent exponent of the special advantages of liquid fuel for vessels of war. The use of this fuel on the Caspian Sea began in 1870, and is quite the recognized custom in about 200 vessels. The fact that the vessels navigate in fresh water, and can, therefore, afford an unlimited supply of steam for pulverising the fuel without any risk of undue incrustation to their boilers is an important factor. The Russian law, however, prohibiting the exportation of liquid fuel has been the dominant factor in the confinement in the use of liquid fuel at sea to the Caspian for at least a generation after its successful use there has been demonstrated.

Whilst the advantages of liquid fuel, and the possibility of its successful mechanical use, have been generally admitted, little or no progress in its application had been made outside the Russian inland sea just referred to, and the reason of this stagnation has been mainly of a commercial character. The supply of fuel outside Russia has been but nominal, and no general application was possible, unless both war and mercantile vessels could be assured of continuous supply from year to year, and unless that supply were as regularly accessible at as frequent and convenient oiling stations throughout the world as already exist in the case of coal fuel, and at a cost proportionately as low. Such a condition of things never became possible until the recent discovery of large supplies of oil suitable for fuel, first in Borneo and Burmah, and quite recently in Texas and California. It is to be regretted that the only one of these sources of supply that lies in British territory is that of Burmah.

The whole aspect of the question, whether regarded by the Admiralty, the shipowner, or the naval architect, has been changed by the assurance of continuous supplies of liquid fuel, and it becomes necessary to treat the question, not only as of practical importance, but of urgency to those responsible for the highest efficiency of fighting and carrying ships. The British Admiralty has determined to exhaustively test the use of this newly-resuscitated means of evaporation, and the reference to the question by the First Lord in his recent memorandum is a clear indication of progressive policy—a policy which is understood to extend to trials not only in destroyers, but also in three cruisers and one battleship. The Italian Admiralty has been pursuing the question for some years, even before large supplies were assured. The German Admiralty have used liquid fuel on the China station for many months in lieu of coal for auxiliary purposes on board ship. The Hamburg-American S. S. Co. have fitted four steamers for liquid fuel in regular use. Danish shipowners have ordered the building in Germany of two steamers to burn liquid fuel; and some twenty vessels under the British flag are now running regularly under liquid fuel; whilst at least a dozen are building with suitable fuel apparatus included in their design.

It may be expected that the supply to these stations will be drawn as regards the ports east of the Suez Canal from Borneo and Rangoon, and as regards those west of the canal and in South America from the Texas fields; South African stations being neutral as regards the heavy charges of the Suez Canal, and therefore likely to draw their supply from Borneo or Texas with equal economy. The South American stations will no doubt be supplied from the Texas and California fields.

* (Read at the spring meetings of the British Institution of Naval Architects, by Sir Fortescue Flannery, M.P., Member.

THE H. W. Johns-Manville Co., 100 William street, New York, have issued another pamphlet extolling the merits of the "Keystone Air Insulator," with reprints of many valuable testimonials from prominent users.

NOTICE TO MARINERS.

UNITED STATES OF AMERICA—NORTHERN LAKES AND RIVERS.—MICHIGAN.

TREASURY DEPARTMENT,
OFFICE OF THE LIGHT-HOUSE BOARD,
WASHINGTON, D. C., May 7 1902.
LAKE MICHIGAN.

SOUTH FOX ISLAND SHOALS GAS BUOY.—Notice is hereby given that, on or about May 8, 1902, a gas buoy, painted black, showing a fixed white light during periods of 10 seconds separated by eclipses of 10 seconds' duration, and marked "South Fox," will be established in about 26 feet of water, on the southerly side of the passage south of South Fox Island, and 2 miles S. 9° E. (S. 11-16 E.) from South Fox Island Light-House, northerly end of Lake Michigan.

Beaver Island Light-House, N.E. 5/8 N., 19 1/8 miles.

Grand Traverse Light-House, S.E. 7/8 E., 16 9-16 miles.

SOUTH FOX ISLAND SHOALS SOUTH BUOY.—Notice is hereby given that, on or about May 8, 1902, a red, second-class nun buoy will be established, in about 30 feet of water, on the southerly end of the South Fox Island Shoals, 9 1-16 miles S. 1° W. (S. 1/8 W.) from South Fox Island Light-House, northerly end of Lake Michigan.

Beaver Island Light-House, N.N.E. 5/8 E., 26 1/4 miles.

Grand Traverse Light-House, E. 7/8 S., 14 3/8 miles.

Bearings are true; miles are statute miles.

By order of the Light-House Board:

W. MAYNARD.

Captain, U. S. Navy, Naval Secretary.

LIGHT-HOUSE ESTABLISHMENT,
OFFICE OF THE LIGHT-HOUSE INSPECTOR, 10TH DISTRICT,
BUFFALO, N. Y., May 7, 1902.

LAKE ERIE, N. Y.—Notice is hereby given that on May 6, 1902, a gas lighted buoy showing a fixed white light of 10 seconds duration, followed by an eclipse of 10 seconds and painted with red and black horizontal stripes, was temporarily placed to mark the wreck of the Tug Acme, the compass bearings of which are as follows:

Horseshoe Reef Light-House, N.N.E. 1-16 E., 1 5/8 miles.

Buffalo Light-House, N.E. by E. 1-16 E., 2 5-16 miles.

Windmill Point, W. 7/8 N., 4 miles.

This buoy will be retained in its present position until the removal of the wreck.

By direction of the Light-House Board.

A. DUNLAP, Commander, U. S. N.
Inspector 10th L. H. District.

DREDGING CONTRACTORS TOO TARDY.

Dredging contracts on the lakes deluged Senator Hanna with telegrams this week, almost demanding that the appropriations for a dredge for Cleveland be stricken from the river and harbor bill. The messages came from many different dredging concerns, also Cleveland firms.

It is too late to strike out this section of the bill. The provision in question passed the House and was concurred in by the Senate without amendment. This renders it exempt from either elimination or amendment by the conference committee of the two houses, to which the measure has been referred. Therefore Senator Hanna would be unable to comply with the directions of the dredgers, even were he inclined to do so. But the Senator regards the provision referred to as a proper one. The proposed dredge will practically pay for itself within a year, according to the War Department engineers, who have figured that dredging which now costs the government between 30c and 38c a cubic yard, could be done for between 7c and 8c.

There is no possible excuse for the contractors not making their wishes known months ago. Maj. Dan C. Kingman, Corps of Engineers, U. S. A., stationed at Cleveland, has repeatedly announced his intention of securing a large, powerful and well equipped dredge for his district, and the subject matter has been treated at column length time and again. The act of Congress

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without attention, and can be seen
a distance of six miles.

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granting the appropriation for a dredge reads as follows:

"The Secretary of War is authorized to cause to be purchased or built, a suitable dredge for use in the improvement and maintenance of the harbors upon Lake Erie, at a cost not to exceed \$175,000, to be paid for from appropriations made or authorized for the harbors mentioned in this paragraph, and in amounts not exceeding those hereafter mentioned, namely: From the amount authorized to be expended for improving the harbor at Toledo by providing a straight channel through Maumee river and bay, under the River and Harbor Act of March 3rd, 1899, \$40,000; from the appropriation for Sandusky \$40,000; from that for Cleveland, \$40,000; from that for Fairport, \$25,000; from that for Ashtabula, \$20,000; from Conneaut \$10,000, and in case the total expenses of the said dredge shall be less than \$175,000, a proportional reduction shall be made from the amounts to be charged to each of said harbors."

"THE BOILER MAKER AND SHEET METAL WORKER,"—A GENEROUS OFFER.

The "Boiler Maker" is a monthly journal and stock list devoted to the trade, and established in 1842, by Joseph T. Ryerson & Son, Chicago.

In the contents of the April number just now before us, we find the following solid sense and generous philanthropic offer for the betterment of the trade:

"In the last three years a considerable number of the older boiler manufacturers have passed away, not only in Chicago, but throughout the country. They were all men who combined mental, with physical strength, which qualities were necessary to make them the masters over their fellows. They all began in the ranks of journeymen. But now their successors may be striplings in body, but giants in mind. We do not hesitate to make the prophecy, that the greatest success will be found in those concerns that embrace in their organization the largest degree of technical knowledge. Experience will develop skill. Muscle is needed less every day; machinery does all but think, and the better the machinery the better the "thinker" must be, and how to supply the demand for educated foremen or superintendents is a source of much thought to us.

"In the early pioneer days of boiler manufacturing in the West, of which Chicago was the center, Joseph T. Ryerson was the wise counsellor and friend to many. Credit was then the chief need and it was freely given. While that need may occasionally exist, it is fortunately rare now, but there is a crying demand for intellectual aid on the part of the sons of both masters and men. We wish there was a more delicate way of indicating our desire in this matter than in print, but of the thousands that read this, there may be one that will give the needed suggestions, and this is our excuse for using the medium of the Boiler Maker.

In grateful appreciation of the prosperity which has always been given us, and in memory of the name and spirit of the founder of this house, we stand ready to contribute \$1,500 a year toward scholarships, or other sources of knowledge, dealing with steam engineering and the fabrication and erection of sheet metal in all forms. It should be available alike to the ambitious rivet boy, to the journeyman who would arise from the ranks, or even to that son who would succeed his well-to-do father.

"The details which are necessary for the wise use of this offer we falter over, but with the knowledge which the bare fact affords, we feel assured some plan will be forthcoming to enable us to make the "Ryerson Scholarships" a means of inspiration and benefit to many, in years to come."

Nothing further than a perusal of the foregoing, with the knowledge that the house has been in the trade for upwards of half a century, is necessary for any reader to draw rightful and righteous conclusions therefrom. For our part, we think that there ought to be more of the Joseph T. Ryerson & Son caliber floating around in other branches, as well as the boiler making and sheet metal working industry.

FOR CANADIAN SHIPYARDS.

"The yard will be extensive enough to enable us to lay down a keel 700 feet long, and we hope to have the plant ready for the building of the steamers intended for the fast Atlantic service."

The foregoing announcement was made by Mr. H. Crowe, a promoter of the steel shipbuilding plant in Halifax, N. S. The granting of assistance by the Dominion Government was the inducement held out to Mr. G. B. Hunter, of the great shipbuilding firm of Swan & Hunter, to begin steel shipbuilding in Nova Scotia.

The capital of the company will be several million dollars, and Mr. Hunter will subscribe one-half of the total amount, on condition that the promoters at Halifax and their friends will take the remainder. The Legislature of Nova Scotia has, Mr. Crowe added, already voted \$100,000; the town of Dartmouth, on the opposite side of the harbor, will contribute \$100,000, and the city of Halifax will vote, April 24, to aid the enterprise to a like extent.

Mr. Crowe said that Mr. Whitney, president of the Dominion Iron & Steel Co., had favored Sydney as the most suitable place for iron shipbuilding, and so did Mr. Hunter, but the latter had changed his mind in favor of Halifax, and he hopes that within two years the plant will be in full operation. At first, Mr. Crowe said, the boilers and engines would be made elsewhere, but eventually a complete ship would be turned out at Halifax.

The promoters submit that in order to encourage the investment of capital and labor in this industry the Government of Ottawa should pass a measure granting assistance for a term of years, long enough to establish the industry, so that it may hold its own against outside competitors. Mr. Crowe said that it is the opinion of those who have collected information on the subject, that it will require at least 10 to 15 per cent. of the cost of similar tonnage built in Great Britain to equalize conditions as they exist in Canada, and that such assistance should continue for twenty years. The imperative necessity for immediate action in this matter is emphasized by the present lack of Canadian tonnage on the Great Lakes for the movement of the grain crops of the Northwest.

Shipbuilding yards and works, Mr. Crowe said, are in process of installation on Lake Huron and Lake Ontario. Several small vessels have been constructed, and those engaged in these enterprises are prepared to go forward in the construction of large ships, provided that conditions are offered such as will put the Canadians upon an equality with his competitors abroad. Men and capital are in sight for the establishment of yards on the Atlantic coast, and from those interested in the commerce of the Pacific coast similar appeals have come.

JAMES B. CONNOLLY, the son of a New England skipper, who went to the Greek games and won a first prize, will have another of his graphic sea sketches in the June Scribner's, this one describing a trip "On a Baltic Sea Sloop." Mr. Connolly has now pictured the three great groups of fishermen—Gloucester, North Sea and Baltic.

JAMES SPENCE ROBERTSON.

If JAMES SPENCE ROBERTSON belonging to Dundee, Scotland, who was, it is believed, about 1889 in Tawas City, Michigan, U. S., and who was, it is understood, latterly acting as a Steward on a Lake Steamer running out of Bay City, Michigan, U. S., will communicate with the Subscribers, he will learn something to his advantage.

REID, JOHNSTON & Co.,
34 Reform St., Dundee, Scotland. Solicitors.

SUN'S AMPLITUDES.

The following approximate amplitudes of the sun's rising or setting will be given each week in this column during the season of navigation. A second bearing may be taken by compass at sunset, by reversing the east bearing given for the nearest latitude, as the change in declination for a few hours makes but a slight difference in the true bearing of the sun's setting. The bearing may be taken when the sun's center is on the horizon, rising or setting. The elements which may be obtained by taking these amplitudes are the quantities known as local attraction, variation and deviation, or the total difference between compass and true, or geographical bearings.

LAKE ERIE AND S. END LAKE MICHIGAN, LAT. 42° N.
Date. Amplitude. Bearing P'ts. Bearing Comp.
May 16..... E. 26° N. = N. 5 3/8 E. = N. E. by E 5/8 E.
May 22..... E. 31° N. = N. 5 1/4 E. = N. E. by E 1/4 E.

LAKE ONTARIO, S. END HURON AND CENTRAL PORTION LAKE MICHIGAN, LAT. 44° N.

Date. Amplitude. Bearing P'ts. Bearing Comp.
May 16..... E. 27° N. = N. 5 3/8 E. = N. E. by E 5/8 E.
May 22..... E. 32° N. = N. 5 1/2 E. = N. E. by E 1/2 E.

N. END LAKES HURON AND MICHIGAN, LAT. 46° N.

Date. Amplitude. Bearing P'ts. Bearing Comp.
May 16..... E. 28° N. = N. 5 1/2 E. = N. E. by E 1/2 E.
May 22..... E. 33° N. = N. 5 E. = N. E. by E

LAKE SUPERIOR, LAT. 48° N.
Date. Amplitude. Bearing P'ts. Bearing Comp.
May 16..... E. 29° N. = N. 5 3/8 E. = N. E. by E 3/8 E.
May 22..... E. 35° N. = N. 4 7/8 E. = N. E. 7/8 E.

With a compass correct magnetic, the difference between the observed and true bearing or amplitude will be the variation for the locality. Should there be any deviation on the course the vessel is heading at the time of taking the bearing, the difference between the observed and the true amplitude after the variation is applied will be the amount of deviation on that course. If the correct magnetic bearing is to the right of the compass bearing, the deviation is easterly, if to the left, the deviation is westerly.

LAKE LEVELS.

The gage records of the United States Lake Survey show the following mean stages of water for April, above mean sea-level: Lake Superior 601.46 ft.; Lakes Huron and Michigan 579.47 ft.; and Lake Erie 571.58 ft. These stages show Lake Superior to have been 0.20 ft. lower than during same month last year, and 0.01 ft. higher than in April, 1895; Lakes Huron and Michigan were 0.62 ft. lower than during same month last year, and 0.07 ft. lower than during April, 1895; Lake Erie was 0.20 ft. higher than during same month last year, and 0.23 ft. higher than during April, 1895.

FURTHER TEST OF FUEL OIL ON STEAMERS.

The steamship Breakwater, of the United Fruit Company's fleet, was recently fitted for burning oil as fuel, and has made the trip from New Orleans to Central America and return. The owners of the vessel are investigating the feasibility of adopting oil entirely, and accurate records of the performance of the engines and boilers utilizing the new fuel were kept. The report of the trial, which extended over several thousand miles, gives some interesting figures on the relative advantages of the liquid fuel. The Breakwater consumed 850 bbls. of oil, as against 218 tons of coal that she has usually used for the same trip. The saving in cost is one-half, in addition to dispensing with the services of 6 firemen, amounting to a total of over \$9,000 a year on that vessel. The engineers report that the oil is a more reliable fuel; that the steam remains up to the mark with less effort on the part of the firemen, and that the vessel, as a consequence, makes better time. In fact the report is favorable on every point to the substitution of fuel oil for coal. It is so satisfactory that the United Fruit Co. will make such changes in the other vessels of its fleet as will fit them also for burning oil instead of coal, and will erect tanks at the Central American ports where its vessels run for storing the fuel.

Government Proposals.

SEALED PROPOSALS will be received at the office of the Light-House Board, Washington, D. C., until 2 o'clock p. m., June 6, 1902, and then opened, for furnishing the materials and labor of all kinds necessary for the construction and delivery of the twin screw steel steam light-house tender, Crocus, for a fixed sum for said vessel, delivered either at the Buoy Depot, Buffalo, N. Y., or at the light-house depot, Tompkinsville, N. Y., as will be determined upon by the Light-House Board. Proposals, plans and specifications can be had by applying to the Light-House Board, Washington, D. C., or at the office of the Light-House Inspector, Buffalo, N. Y. Norman H. Farquhar, Rear-Admiral, U. S. N., Chairman. 20

U. S. ENGINEER OFFICE. Jones Building, Detroit, Mich., April 19, 1902. Sealed proposals for dredging, and other work required for removing obstructions to navigation in main ship channel in Detroit river, will be received here until 12 noon, (Standard time), May 19th, 1902, and then publicly opened. Information furnished on application. W. H. BIXBY, Major, Engrs. 17-20

FOR SALE One Air Pump 31 inch diameter, 12 inch stroke, arranged for direct connection, in good condition, taken from S. S. Manitou to be re-placed by a larger one.

Also one hoisting engine 12 inch cylinder made by Chas. Elmes, never been used.

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IRON ORE AND COAL.

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FUEL DOCKS: No. 1, Michigan Slip and Basin. 'Phone 3046, Main.
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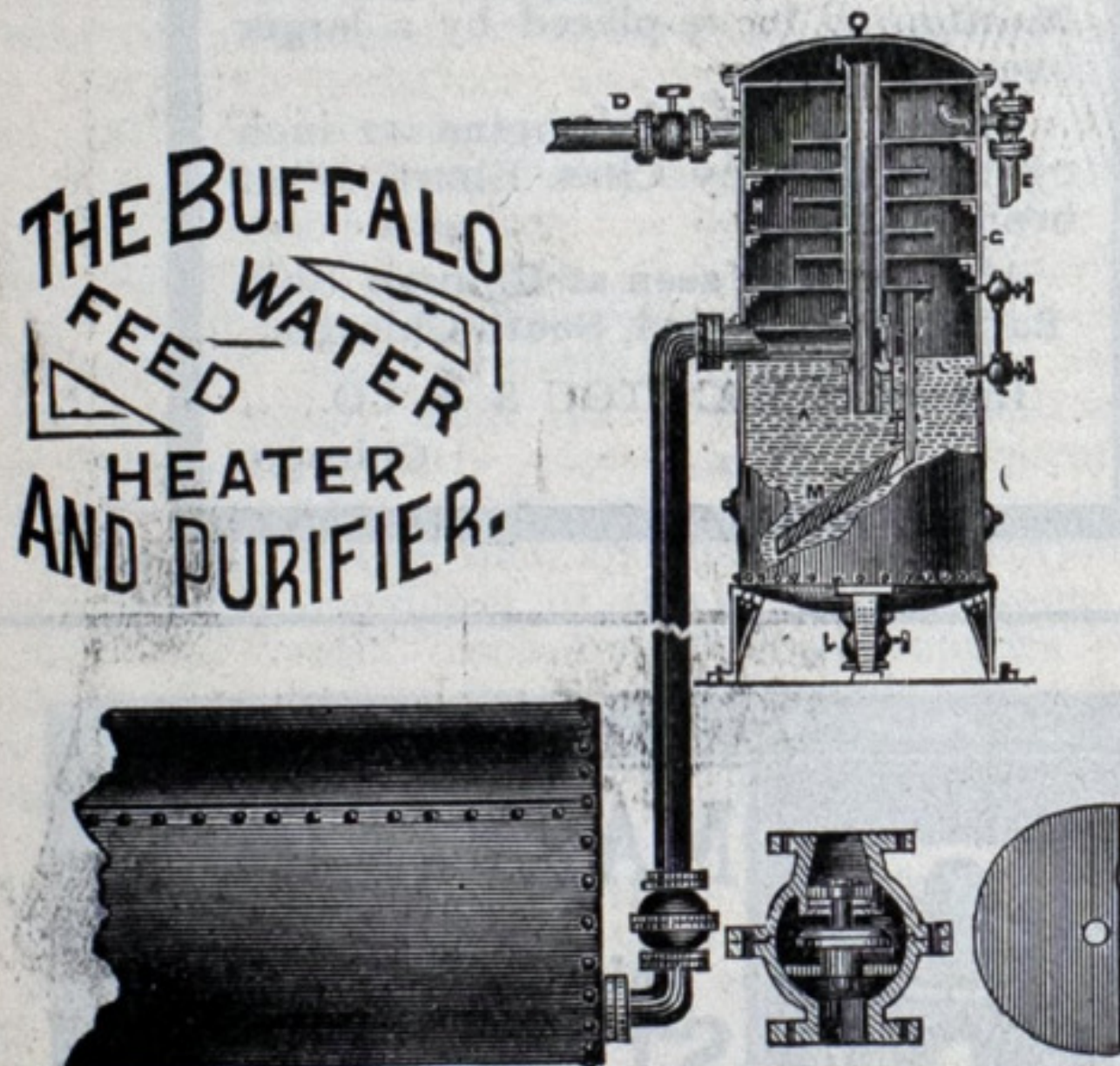
Every Purifier Warranted to Remove all Sediment or Scale-Forming Substance.

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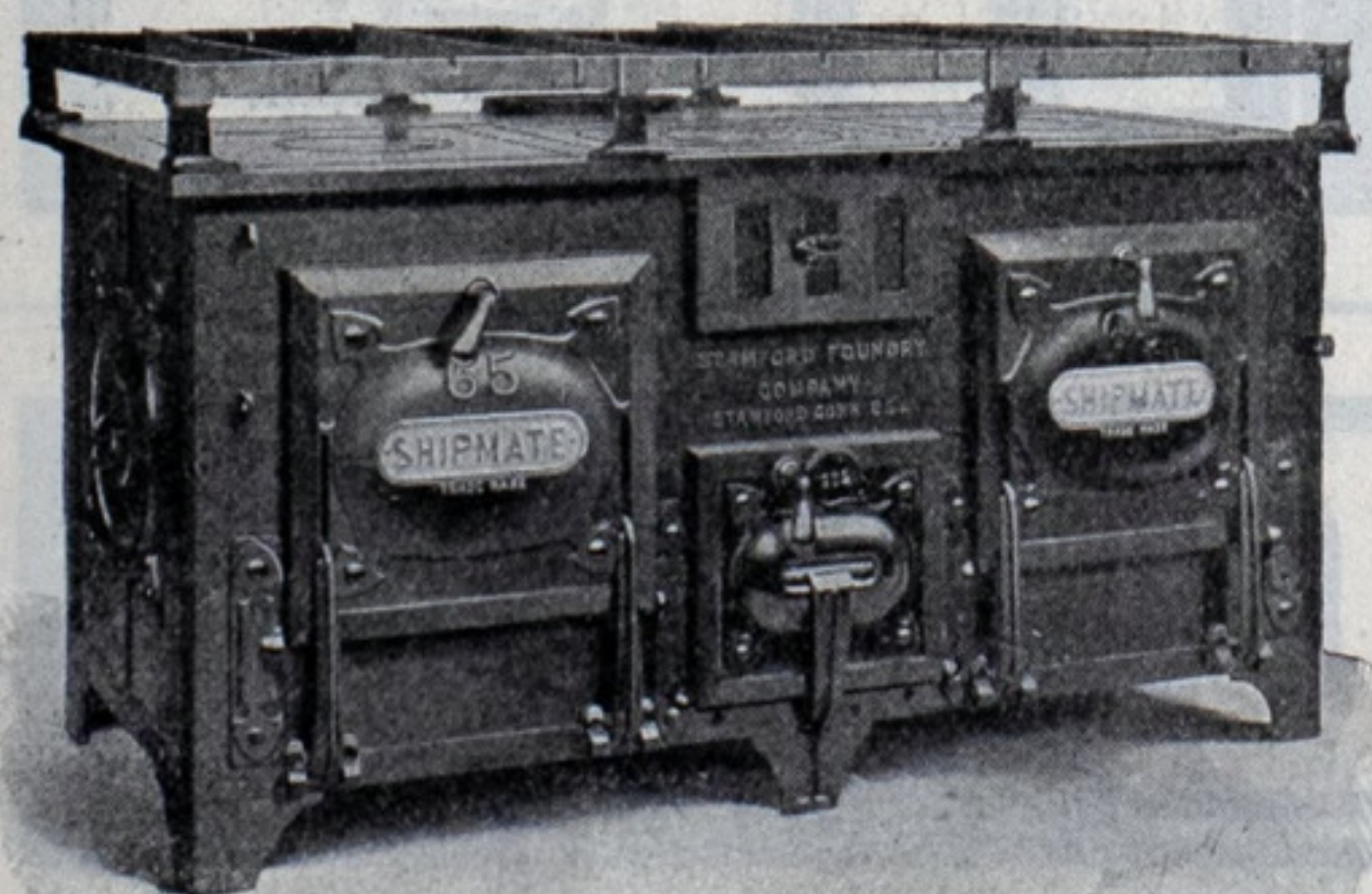
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Brazil, Thomas Maytham and Chili.
Mitchell Transportation Co.'s steamer
Hendrick S. Holden.
Minnesota Iron Co.'s steamer Presque Isle.
American Steel Barge Co.'s steamer Alex.
McDougall.
Lake Michigan & Lake Superior Trans-
portation Co.'s steamer Manitou.
Bessemer Steamship Co.'s steamers S. F.
B. Morse and Douglas Houghton.
American Transportation Co.'s steamers
John Harper and Alex. Nimick.
Red Star Line's steamers Robert Mills and
Wyoming.
Wilson Transit Line's steamers W. D. Rees
and Andrew Carnegie.
And the steamer William R. Linn.

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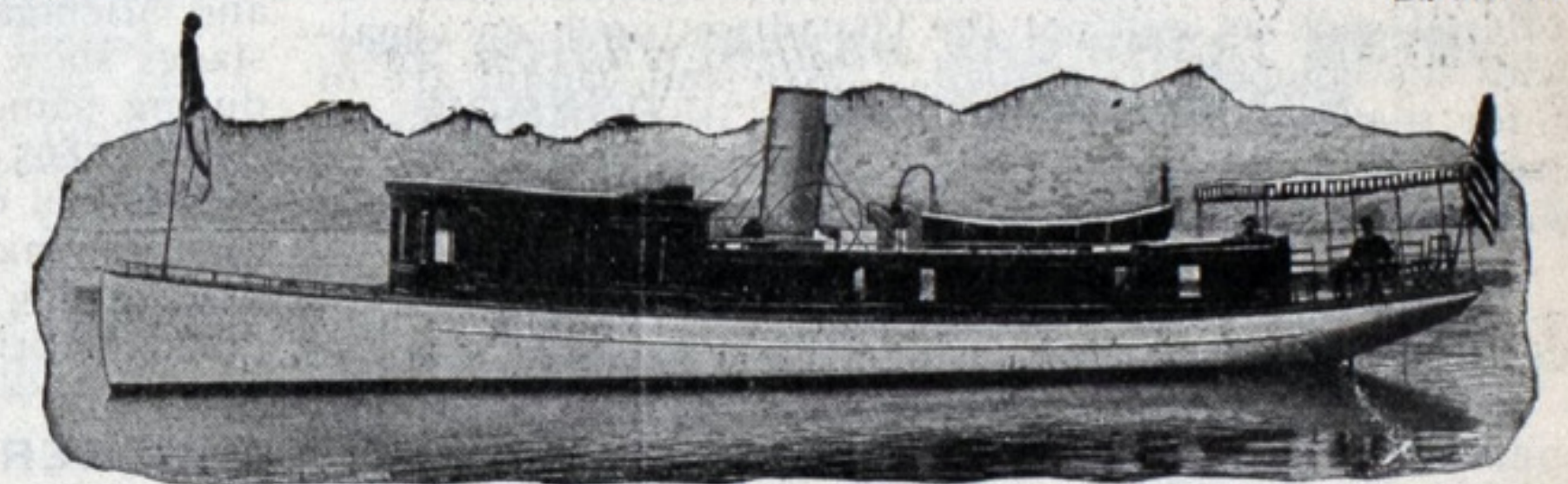
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'Phone, Canal 767.

FLOTSAM, JETSAM AND LAGAN.

The lifeboat heretofore maintained by the Canadian government at Port Rowan, north shore of Lake Erie, has been removed to a point on the shore two and one-half miles westward from the west end of Long point light-house, where a boat house has been built on the low sandy shore.

Capt. Batten is at Toronto to take charge of the new steamer Montreal, and pilot her down the St. Lawrence rapids. It is the captain's intention to run all the rapids, and he expects to go east this week. This latest addition to the R & O's fleet is the largest and finest vessel yet turned out of a Canadian shipyard, and will be the largest vessel that ever ran from the lakes to Montreal, her length being 340 feet and breadth 74 feet 6 inches. Her trip down the St. Lawrence will be watched with interest.

The commerce of the two French colonies, Martinique and Guadeloupe, with the United States has amounted to nearly \$2,000,000 per annum during a long term of years, a large proportion being exports from the United States to those islands. In the year 1900 our exports to the islands were \$1,857,168, and our imports from the islands \$30,176. From them we import chiefly vanilla beans, while our exports to them are flour, cotton seed and mineral oils, coal, lard, meats, and lumber.

In a fire on the steamer Iona, at Oswego, N. Y., on Saturday, John Campau, of Trenton, Ont., a fireman, lost his life, and damage aggregating \$8,000 was done. The steamer settled on the bottom of Oswego harbor after five engines and a tug got the fire under control. The Iona had 250 tons of coal on board when the fire started. During the blaze a life-saving crew worked about the vessel rendering assistance to the crew. Fireman Campau was lost in the fire and his body burned to a crisp. The Iona is owned by F. A. Hall, of Ottawa, Ont., and is insured for \$6,500.

Milwaukee is to have a mile and a half of new docks this year. The work is now under way in several places, and much of it is along a territory where there are docks which must be rebuilt to meet the requirements of the increased shipping business. The largest single piece of work is that being done by the Milwaukee Gas Light Co., opposite Cox Bros' docks, in the Menominee river. The company will build 2,000 feet of new docks. The Milwaukee road has completed 600 feet on the south branch of the river for a cement company. Other concerns which are building docks are the Whithall Coal Co. and the Milwaukee-Western Fuel Co.

Government Proposals.

TREASURY DEPARTMENT, Office of General Superintendent U. S. Life-Saving Service, Washington, D. C., April 26, 1902. Sealed proposals will be received at this office until 2 o'clock p. m. of Monday, the 26th day of May, 1902, and then publicly opened, for furnishing supplies required for use of the Life-Saving Service for the fiscal year ending June 30, 1903; the supplies to be delivered at such points in New York City, Grand Haven, Mich., and San Francisco, Cal., as may be required, and in the quantities named in the specifications. The supplies needed consist of beds and bedding, blocks and sheaves, cordage, crockery, furniture, hardware, lamps, lanterns, etc.; medicines, etc.; paints, oils, etc.; ship chandlery; stoves, etc.; tools and miscellaneous articles; all of which are enumerated in the specifications attached to the form of bid, etc.; which may be obtained upon application to this office, or to the Inspector of Life-Saving Stations, 17 State street, New York City; Superintendent Twelfth Life-Saving District, Grand Haven, Mich.; and Superintendent Thirteenth Life-Saving District, New Appraisers' Stores, San Francisco, Cal. Envelopes containing proposals should be addressed to the "General Superintendent U. S. Life-Saving Service, Washington, D. C." and marked on the outside "Proposal for Annual Supplies." The right is reserved to reject any or all bids, and to waive defects, if deemed for the interests of the Government. S. I. KIMBALL, General Superintendent. 18-19

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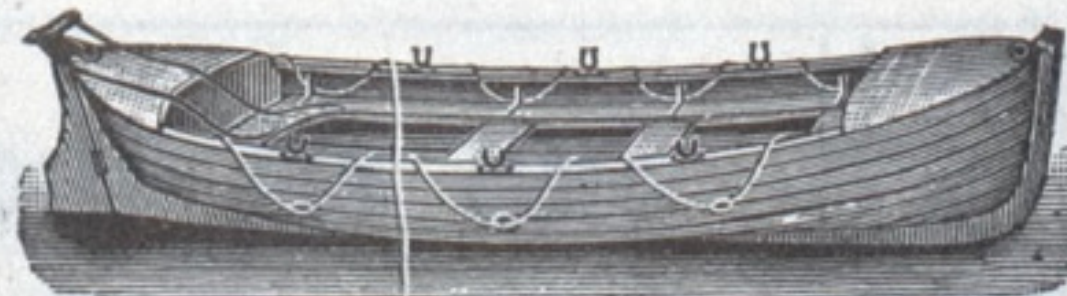
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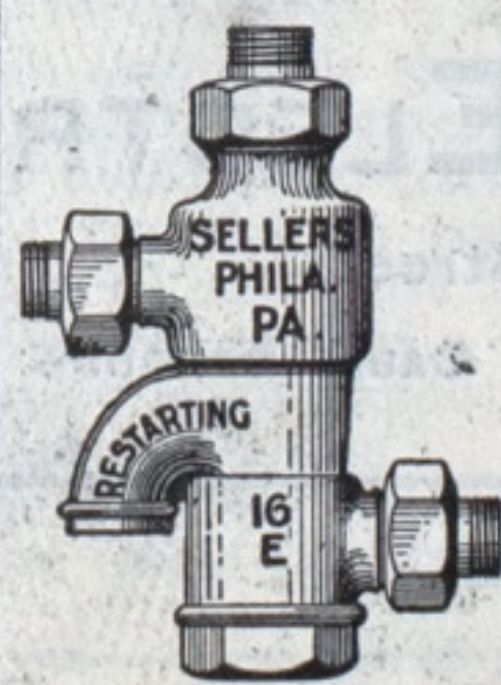


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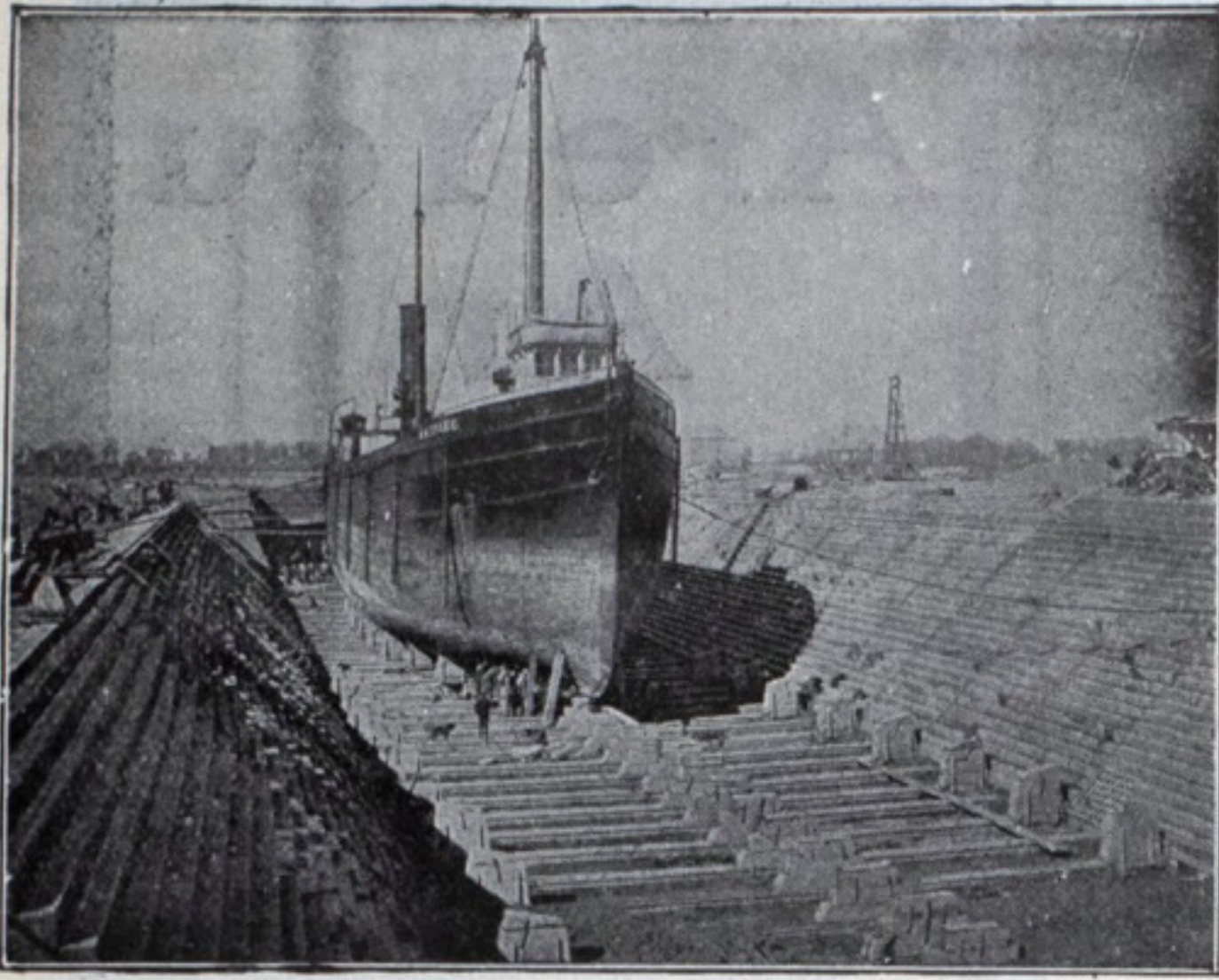
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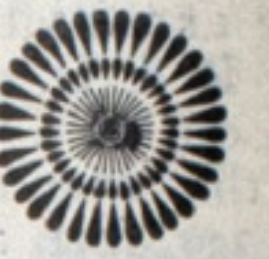
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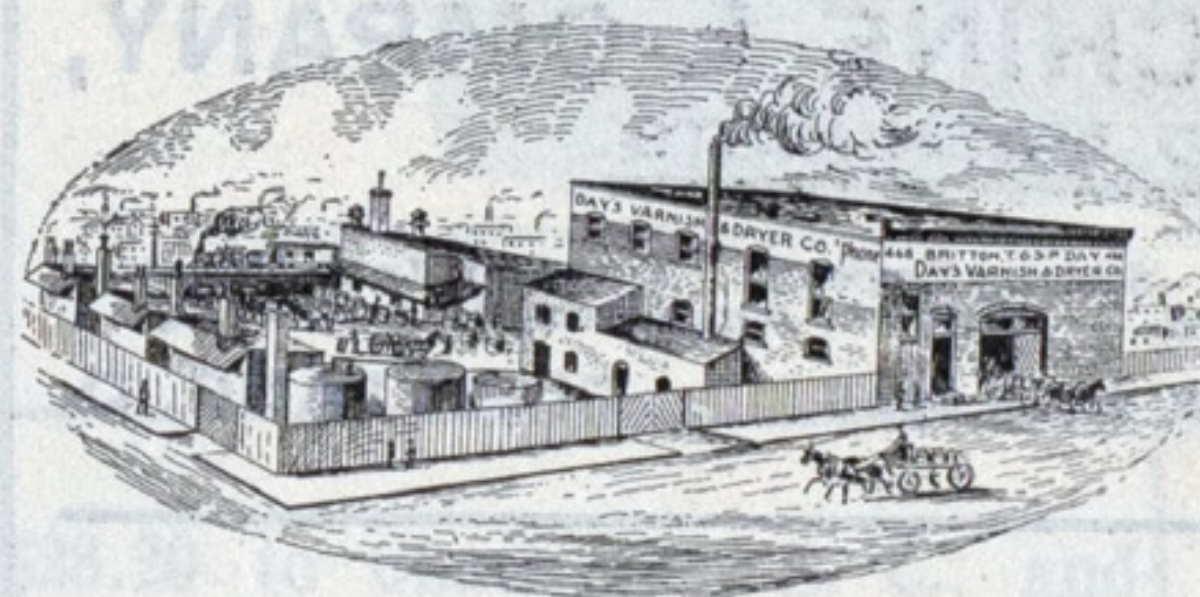
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